Basis of Estimate as of Mon 4/15/02
RunIIbTotal

WBS	Name	Cost
		$0.00
1	Run2b Silicon Detector Schedule	############
1.1	Run 2b Silicon Project	$13,616,229

Notes

Table summarises the number of parts needed to the project:

Layer	Type	Φ-seg.	Z-seg.	Length	Width	Pitch	Total
5	A	30	6	96.4	40.5	75/37.5	360
5	A	30	6	96.4	40.5	75/37.5	360
4	A	24	6	96.4	40.5	75/37.5	288
4	2.5°	24	6	96.4	43.1	80/40	288
3	A	18	6	96.4	40.5	75/37.5	216
3	2.5°	18	6	96.4	43.1	80/40	216
2	A	12	6	96.4	40.5	75/37.5	144
2	2.5°	12	6	96.4	43.1	80/40	144
1	A	6	6	96.4	40.5	75/37.5	72
1	A	6	6	96.4	40.5	75/37.5	72
0	A	12	6	96.4	14.8	50/25	144

	Sensors	Modules	Staves	4-chips hybrids	2-chips hybrids	MPC	JPC
Outer Axials	1512	756	180	1080	0	180	40
Outer Stereo	648	324					
L0	144	72	0	0	72	0	16
TOTAL	2304	1152	180	1080	72	180	56

1.1.1	DAQ	$6,099,195
1.1.1.1	SVX4 Chips	$1,071,335

Notes

Runs:
1. Prototype (Hybrid #1)
2. Contingency (Hybrid #2)
3. Production (Preproduction and Production hybrids)

Need **4,464** chips for the project

WBS	Name	Cost
1.1.1.1.1	1st chip: layout	$135,880

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 7/2/01	Mon 7/2/01	$88,014	$0	$0	$88,014
4	ItalyEQ	0%	0 hrs	0 days	Mon 7/2/01	Mon 7/2/01	$25,000	$0	$0	$25,000
7	Elect. Engineer	30%	448.8 hrs	0 days	Mon 7/2/01	Mon 4/1/02	$22,866	$0	$0	$22,866
16	NonFnal Labor	100%	1,496 hrs	0 days	Mon 7/2/01	Mon 4/1/02	$0	$0	$0	$0

Notes

Cost:
This is labor cost at LBL as from Henrik Van Der Lippe
project file svx4_0202.mpp of March 20 2002:
$241,028 to be equally split between CDF and D0.
Labor:
LBL provided an equivalent of 1 engineer for ~1.6 years to the project (Costed as R&D)
FNAL provided an equivalent of 1 engineer for ~3 months on the project (Costed as Labor)
INFN-Padova provided 1 engineer for ~1 year on the project (Not Costed)

WBS	Name	Cost
1.1.1.1.2	1st Chip submission (eng. Run)	$0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	100%	0 hrs	0 days	Mon 4/1/02	Mon 4/1/02	$0	$0	$0	$0

Notes

Schedule:
This is the first submission of the new svx4 chip on 0.25um technology.
The minimum order is for ~10wafers and is a joint CDF,D0 and BTeV submission (not equally divided).

WBS	Name	Cost
1.1.1.1.3	1st chip: documentation	$15,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 4/1/02	Mon 4/1/02	$7,500	$0	$0	$7,500
3	FNALCont	0%	0 hrs	0 days	Mon 4/1/02	Mon 4/1/02	$7,500	$0	$0	$7,500

Notes

Labor:
This is labor at LBL associated with producing the necessary documentation for the chip.

WBS	Name	Cost
1.1.1.1.4	1st Chip: manufacturing	$58,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 4/1/02	Mon 4/1/02	$58,000	$0	$0	$58,000

Notes

Schedule:
8 weeks for fabrication at TSMC

WBS	Name	Cost

"1st Chip: manufacturing" continued

Notes
Cost:
total cost is 200K$ for 10 wafers minimum order. This order is split between CDF, D0 and BTeV
Cost for CDF is 50K$ for masks + 8K$ for chips

1.1.1.1.5   1st Chip: postprocessing $10,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Tue 5/28/02	Tue 5/28/02	$5,000	$0	$0	$5,000
3	FNALCont	0%	0 hrs	0 days	Tue 5/28/02	Tue 5/28/02	$5,000	$0	$0	$5,000

Notes
Schedule:
2 weeks for backgrounding, backplating and dicing
Cost:
Total is 15K$ (Engineering Estimate). CDF part is 5K$

1.1.1.1.6   1st Chip: engineering evaluation at FNAL $8,152

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	100%	160 hrs	0 days	Wed 6/12/02	Wed 7/10/02	$8,152	$0	$0	$8,152

Notes
Labor:
This is FNAL labor only. It included enginnering type tests.

1.1.1.1.7   1st Chip: engineering evaluation at LBL $27,624

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Tue 6/11/02	Tue 6/11/02	$13,812	$0	$0	$13,812
3	FNALCont	0%	0 hrs	0 days	Tue 6/11/02	Tue 6/11/02	$13,812	$0	$0	$13,812

Notes
Labor:
This is labor cost at LBL as from Henrik Van Der Lippe and Ray Yarema (3/19/02)
project file svx4_0202.mpp of March 20 2002.
Tests performed at LBL include radiation damage assesment. Other tests including radiation damage assesment will also be performed at INFN-Padova.

1.1.1.1.8   1st Chip: evaluation $3,072

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	20%	128 hrs	0 days	Wed 6/12/02	Thu 10/3/02	$3,072	$0	$0	$3,072

WBS	Name	Cost

"1st Chip: evaluation" continued

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
12	Research Associate	150%	960 hrs	0 days	Wed 6/12/02	Thu 10/3/02	$0	$0	$0	$0
15	Scientist	50%	320 hrs	0 days	Wed 6/12/02	Thu 10/3/02	$0	$0	$0	$0

Notes

General:
This is the evaluation of the chip with CDF Data Aquisition System. Also we will evaluate the performance of the chip with real sensor using both a laser and a radiactive source.
Labor:
1) Postdocs (150%) for testing the chip with the real DAQ, modify programs etc.
2) electrical technician (20%) needed for support with electrical board stuffing/testing.
3) Scientist (50%) to coordinate the effort

1.1.1.1.9   1st Chip ready for hybrids $0

Notes

Schedule:
This is 1 month after receiving the Eng.run parts.
This is agressive and assumes the chip works without major problems.

1.1.1.1.10   2nd Chip: layout $116,224

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 10/3/02	Thu 10/3/02	$54,036	$0	$0	$54,036
3	FNALCont	0%	0 hrs	0 days	Thu 10/3/02	Thu 10/3/02	$54,036	$0	$0	$54,036
7	Elect. Engineer	100%	160 hrs	0 days	Fri 10/4/02	Thu 10/31/02	$8,152	$0	$0	$8,152

Notes

This starts after chip evaluation completes, but it could start earlier.
Labor:
moslty LBL labor
FNAL will provide 1 engineer for 20 days during this period

1.1.1.1.11   2nd Chip: submission (eng. Run) $0

Notes

General:
This is the 2nd engineering run submission with only svx4 devices. If changes are minor wrt 1st chip, all production wafers might be ordered at this time. For the purpose of this schedule we will order here 5 wafers worth of svx4 chips for CDF

Basis of Estimate as of Mon 4/15/02
RunIIbTotal

WBS	Name	Cost
1.1.1.1.12	2nd Chip: manufacturing	$125,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 10/31/02	Thu 10/31/02	$100,000	$0	$0	$100,000
3	FNALCont	0%	0 hrs	0 days	Thu 10/31/02	Thu 10/31/02	$25,000	$0	$0	$25,000

Notes

Cost:
The minimum order cost is 200K$ which yields 10 wafers worth of chips.
100K$ is the CDF part. We also may want to order extra wafers to get us through the rpeproduction phase. The extra cost is 25K$ (10 wafers) which we have as contingency.

WBS	Name	Cost
1.1.1.1.13	2nd Chip: postprocessing	$11,250

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 1/9/03	Thu 1/9/03	$7,500	$0	$0	$7,500
3	FNALCont	0%	0 hrs	0 days	Thu 1/9/03	Thu 1/9/03	$3,750	$0	$0	$3,750

Notes

Schedule:
2 weeks for backgrounding, backplating and dicing
Cost:
Total is 15K$ (Engineering Estimate). CDF part is 7.5K$

WBS	Name	Cost
1.1.1.1.14	2nd Chip: engineering evaluation at FNAL	$4,076

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	80 hrs	0 days	Fri 1/24/03	Thu 2/20/03	$4,076	$0	$0	$4,076

Notes

Most of the "low level" testing will be performed at LBL.
FNAL labor is mostly in testing the chip with the final DAQ chain at SiDet and Feynman.

WBS	Name	Cost
1.1.1.1.15	2nd Chip: engineering evaluation at LBL	$12,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 1/23/03	Thu 1/23/03	$6,000	$0	$0	$6,000
3	FNALCont	0%	0 hrs	0 days	Thu 1/23/03	Thu 1/23/03	$6,000	$0	$0	$6,000

Notes

Labor:
This is labor cost at LBL as from Henrik Van Der Lippe
project file svx4_0202.mpp of March 20 2002.
Tests performed at LBL include radiation damage assesment.

WBS	Name	Cost
1.1.1.1.16	Setup for production chip testing	$8,958

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 2/20/03	Thu 2/20/03	$3,750	$0	$0	$3,750
3	FNALCont	0%	0 hrs	0 days	Thu 2/20/03	Thu 2/20/03	$1,250	$0	$0	$1,250
7	Elect. Engineer	25%	40 hrs	0 days	Fri 2/21/03	Thu 3/20/03	$2,038	$0	$0	$2,038
9	Elect. Technician	50%	80 hrs	0 days	Fri 2/21/03	Thu 3/20/03	$1,920	$0	$0	$1,920
15	Scientist	50%	80 hrs	0 days	Fri 2/21/03	Thu 3/20/03	$0	$0	$0	$0

Notes

Schedule:
This is time for getting programs setup and procedures worked
out for testing chips on wafers.
Labor:
Same crew as for the final production testing.
We assume that 1 scientist, 1 technician and 1 research associate will work full time on this task which is both for CDF and D0.
Below is the CDF share:
1. Scientist (50%)
2. Elect. Technician (50%)
3. postdoc (25%) support to CDF
4. Research Associate (50%)
5. Elect. Engineer (5%) chip designer expert
Cost:
Cost is for probe cards, equipment and material. Total (engineering estimate) is $7,500 plus $2,500 for contingency.
CDF share is 50% :
$3,750 EQ
$1,250 CONT.

WBS	Name	Cost
1.1.1.1.17	2nd Chip: evaluation	$1,536

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	20%	64 hrs	0 days	Fri 1/24/03	Thu 3/20/03	$1,536	$0	$0	$1,536
12	Research Associate	150%	480 hrs	0 days	Fri 1/24/03	Thu 3/20/03	$0	$0	$0	$0
15	Scientist	50%	160 hrs	0 days	Fri 1/24/03	Thu 3/20/03	$0	$0	$0	$0

Notes

General:
This is the evaluation of the chip with CDF Data Aquisition System. Also we will evaluate the performance of the chip with real sensor using both a laser and a radiactive source.
Labor:
1) Postdocs (150%) for testing the chip with the real DAQ, modify programs etc.
2) electrical technician (20%) needed for support with electrical board stuffing/testing.
3) Scientist (50%) to coordinate the effort

WBS	Name	Cost
1.1.1.1.18	2nd Chip ready for hybrids	$0

Notes

Schedule:
This is 1 month after receiving the Eng.run parts.
This is agressive and assumes the chip works without major problems.

WBS	Name	Cost
1.1.1.1.19	Production Chip: layout	$69,660

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 3/20/03	Thu 3/20/03	$32,792	$0	$0	$32,792
3	FNALCont	0%	0 hrs	0 days	Thu 3/20/03	Thu 3/20/03	$32,792	$0	$0	$32,792
7	Elect. Engineer	50%	80 hrs	0 days	Fri 3/21/03	Thu 4/17/03	$4,076	$0	$0	$4,076

Notes

Labor:
moslty LBL labor.
FNAL will provide help with an engineer 100% for 15 days during this period.

WBS	Name	Cost
1.1.1.1.20	Production chip Submission	$0

Notes

Milestone not linked to anything, it could start as early as 40
days after receiving the engineering run chips

WBS	Name	Cost
1.1.1.1.21	Production Chip: manufacturing	$422,500

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$225,000	$0	$0	$225,000
3	FNALCont	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$97,500	$0	$0	$97,500
4	ItalyEQ	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$100,000	$0	$0	$100,000

Notes

Cost:
Based on MOSIS (TSMC) price.
We need about 5000 chips in the detector + 2,000 spares
We order 14,000 chips to include yield. This is a conservative yield of 50%.
Masks cost is 150K$ (to be split with D0) and 50K$/lot (1lot = 10 wafers). Need to order 5 lots.
Total = 75K$ + 250 K$ = 325K$

WBS					Name		Cost			

1.1.1.1.22 Production Chip: postprocessing $20,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Fri 6/13/03	Fri 6/13/03	$10,000	$0	$0	$10,000
3	FNALCont	0%	0 hrs	0 days	Fri 6/13/03	Fri 6/13/03	$10,000	$0	$0	$10,000

Notes
Schedule:
2 weeks for backgrounding, backplating and dicing.
Cost:
Total cost is $200 per wafer (Engineering Estimate). For 50 wafers = 10K$

1.1.1.1.23 Production Chip: engineering evaluation at LBL $9,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Fri 6/27/03	Fri 6/27/03	$4,500	$0	$0	$4,500
3	FNALCont	0%	0 hrs	0 days	Fri 6/27/03	Fri 6/27/03	$4,500	$0	$0	$4,500

Notes
Labor:
This is labor cost at LBL as from Henrik Van Der Lippe
project file svx4_0202.mpp of March 20 2002.
Tests performed at LBL include radiation damage assesment.

1.1.1.1.24 CDF chips: Test $13,403

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	10%	78.4 hrs	0 days	Tue 7/8/03	Fri 11/21/03	$3,995	$0	$0	$3,995
9	Elect. Technician	50%	392 hrs	0 days	Tue 7/8/03	Fri 11/21/03	$9,408	$0	$0	$9,408
12	Research Associate	75%	588 hrs	0 days	Tue 7/8/03	Fri 11/21/03	$0	$0	$0	$0
15	Scientist	50%	392 hrs	0 days	Tue 7/8/03	Fri 11/21/03	$0	$0	$0	$0

Notes
Schedule:
We are assuming 44 wafers, 320 chips/wafer, and testing rate of 0.5 wafer/day (includes classifying and sorting chips). It will take 88 days.
2 weeks days added for dicing at the end.
1 week added for setup time at the beginning.
Labor:
1 scientist, 1 technician and 1 research associate will workfull time on this which is both for CDF and D0.
Below is the CDF share:
1. Scientist (50%)
2. Elect. Technician (50%)
3. Research Associate (25%) support to CDF
4. Research Associate (50%)
5. Elect. Engineer (10%) chip designer expert

WBS	Name	Cost
1.1.1.1.25	CDF chips: 1/2 chips tested	$0
1.1.1.1.26	Production Chips ready for hybrids	$0

Notes

Schedule:
1st chips are available 4 weeks after start of testing to take into account the testing, dicing and logging necessary.

WBS	Name	Cost
1.1.1.1.27	Chip testing Complete	$0
1.1.1.2	Hybrids	$2,038,538

Notes

The Hybrid is a BeO substrate (2cmx3.9cm).
Included in the bydrids are:
1. 4 SVX4 chips.
2. miscellanea components (capacitors,resistors, thermistor).
3. pitch adapters
4. testing boards

Runs (4 chips hybrids):
1. Prototype#1 (milestone #1 "electrical stave test")
2. Protoype#2-Contingency (milestone #2 "contingency electrical stave test")
3. Preproduction (milestone #3 "preproduction electrical stave test")
4. Production (milestone #4 "Production electrical stave test")

Need **1,080** 4-chips hybrids and **72** 2-chips hybrid for the project

WBS	Name	Cost
1.1.1.2.1	Outer layers	$1,752,946

Notes

Runs (4 chips hybrids):
1. Prototype (milestone #1 "prototype electrical stave test"), Proto#1 chip
2. Contingency (milestone #2 "contingency electrical stave test"), Proto#2 chip
3. Preproduction (milestone #3 "preproduction electrical stave test"), Production chips
4. Production (milestone #4 "Production electrical stave test"), Production chips

Need **1,080** hybrids

WBS	Name	Cost
1.1.1.2.1.1	Hybrid #1: Layout	$0

Notes

Cost of the layout (CAD etc.) is in the manufacturing cost.

WBS	Name	Cost
1.1.1.2.1.2	Hybrid#1: Submission	$0

WBS				Name		Cost			
1.1.1.2.1.3				Hybrid #1: manufacturing		$114,391			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$87,993	$0	$0	$87,993
3	FNALCont	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$26,398	$0	$0	$26,398

Notes

Schedule:
We are planning to order 40 hybrids (outer layers=4chips) to have enough for
building 5 staves plus spares.
Cost:
Based on "FY2002 development cost for CDF Run2b Hybrids & stave bus"
V6.0 Mar-24-2002 (C.Haber, LBL)
Parts, number of parts:
1. Hybrids, 40
2. bus cables, 15
3. pitch adapter, 40
4. hybrid test card, 40
5. BeO blanks for mini port cards, 15
Total cost (including Labor, overhead and test costs) = $87,993

WBS	Name	Cost
1.1.1.2.1.4	Hybrid #1 ready for chips	$0

Notes

Schedule:
This is 10 days after receiving hybrids to allow for some minimal test.

WBS	Name	Cost
1.1.1.2.1.5	Hybrid #1 available	$0

Notes

Available means chips are already mounted bonded and tested with the hybrids.
Schedule:
We are assuming this will be 3 weeks after substrate are available (test and load the substrate) and 2 weeks after chips are available (for mounting, bonding and testing).
This is part of our 1st project milestone (testing an electrical stave).

WBS	Name	Cost
1.1.1.2.1.6	Hybrid #1: Evaluation	$0

Notes

Labor:
Test are done at LBL (no FNAL labor)

WBS				Name		Cost			
1.1.1.2.1.7				Setup Hybrid test stand		$70,491			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 7/11/02	Thu 7/11/02	$46,994	$0	$0	$46,994
3	FNALCont	0%	0 hrs	0 days	Thu 7/11/02	Thu 7/11/02	$23,497	$0	$0	$23,497

WBS	Name	Cost

"Setup Hybrid test stand " continued

Notes

General:
This is the equipment at LBL and UC Davis for testing and burn-in of the hybrids.
It is mostly an update of the existing equipment.
Schedule:
Needs to be completed and in place by the time preproduction hybrids are ready to be tested
Cost:
LBL upgrade costs are handles by LBL with local funds.
UC Davis cost are based on D.Pellet cost estimate of March 23 2002.
Total is $46,994 and includes labor, material and services.
It is likely that some of this money will come from University funds.

1.1.1.2.1.8	Hybrid #2: Layout	$0

Notes

General:
This is a contingency run of hybrids. We would wave this option if the first round of chips+hybrids is working reasonably well. Cost goes all in the contingency.
Schedule:
Hybrid #2 is meant to be used with 2nd round of chips.
Labor:
Cost of the layout (CAD etc.) is in the manufacturing cost.

1.1.1.2.1.9	Hybrid #2: Submission	$0

1.1.1.2.1.10	Hybrid #2: manufacturing	$114,391

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	FNALCont	0%	0 hrs	0 days	Thu 10/31/02	Thu 10/31/02	$114,391	$0	$0	$114,391

Notes

General:
This is a contingency run in case the first hybrid run has major flaws, or modifications occured to the chip from first to second engineering run which requires hybrid modifications.
Cost:
see "Hybrid#1: manufacturing"

1.1.1.2.1.11	Hybrid #2 ready for chips	$0

Notes

Schedule:
This is 10 days after receiving hybrids to allow for some minimal test.

WBS	Name	Cost
1.1.1.2.1.12	Hybrid #2 available	$0

Notes

Available means chips are already mounted bonded and tested with the hybrids.
Schedule:
We are assuming this will be 3 weeks after substrate are available (test and load the substrate) and 2 weeks after chips are available (for mounting, bonding and testing).

WBS	Name	Cost
1.1.1.2.1.13	Hybrid #2: Evaluation	$0

Notes

Labor:
Test are done at LBL (no FNAL labor)

WBS	Name	Cost
1.1.1.2.1.14	Preproduction hybrid: Layout	$0

Notes

Labor:
Cost of the layout (CAD etc.) is in the manufacturing cost.

WBS	Name	Cost
1.1.1.2.1.15	Preproduction Hybrid: Submission	$0
1.1.1.2.1.16	Preproduction hybrid: manufacturing	$197,343

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$151,802	$0	$0	$151,802
3	FNALCont	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$45,541	$0	$0	$45,541

Notes

Schedule:
This has to cover stave production ramp up time.
Preproduction parts should be enough for building ~24 staves.
We assume to sustain a rate of 2 staves/week during preproduction (1 stave/day during production).
Cost:
Based on "cost for phase 2: preproduction phase"
V6.0 Mar-24-2002 (C.Haber, LBL)
Total cost is $151,802. Includes yield, labor, overhead, test cards and tests

WBS	Name	Cost
1.1.1.2.1.17	Preproduction Hybrid ready for chips	$0

Notes

This is 40 (manufacturing)+10 (testing and loading) days after submission as a possible first batch of the pre-production.

WBS	Name	Cost
1.1.1.2.1.18	Preproduction Hybrid Available	$0

Notes

Schedule:
1 month after the production chips are available to be mounted on hybrids
2 weeks for mounting and testing the hybrid.

1.1.1.2.1.19	Preproduction Hybrid complete	$0

Notes

This assumes 10 hybrids delivered to Fermilab per week,
180 hybrids = 90 days of loading and testing

1.1.1.2.1.20	Preproduction Hybrid: Evaluation	$0
1.1.1.2.1.21	Production Hybrid: layout	$0

Notes

General:
This task is contingency.
Labor:
Cost of the layout (CAD etc.) is in the manufacturing cost.

1.1.1.2.1.22	Production Hybrid Go-ahead	$0

Notes

Schedule:
 We need enough time to evaluate the preproduction (we put 40 days = 2 months).
Also we need some time to test the preproduction DAQ chain before committing to the production.

1.1.1.2.1.23   Production Hybrid: manufacturing $1,256,330

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 10/14/03	Tue 10/14/03	$966,408	$0	$0	$966,408
3	FNALCont	0%	0 hrs	0 days	Tue 10/14/03	Tue 10/14/03	$289,922	$0	$0	$289,922

Notes

General:
Quantitiy needed is 1,080 + spares = 1200 hybrids.
Cost:
Based on "Production cost for CDF Run2b Hybrids & stave bus"
V3.0 Mar-24-2002 (C.Haber, LBL)
Total cost is $966,408. Includes yield, labor, overhead, test cards and tests

WBS	Name	Cost
1.1.1.2.1.24	Production Hybrids Available	$0

Notes
This assumes 40 days for completion of the first batch of substrates
plus a month (20days) for loading and testing and setup time.

1.1.1.2.1.25	Production Hybrid: testing	$0

Notes
Schedule:
We need to sustain a rate of 40/week (=8/day) delivered to Fermilab.
We assume production is 1200 hybrids = 150 days of loading and testing.
Labor:
This is handled at LBL and UC Davis with contributions from other institutions partecipating in the project. No labor cost for FNAL.

1.1.1.2.1.26	Hybrid Production Complete	$0
1.1.1.2.2	Layer 0	$285,592

Notes
Runs:
1. Prototype
2. Production

Need **72** 2-chips hybrids.

1.1.1.2.2.1	Prototype#1 L0 hybrid: Layout	$0

Notes
Schedule:
Layout can start as soon as the first outer layer hybrid has been submitted for fabrication.
Labor:
Costed in the manufacturing.

1.1.1.2.2.2	Prototype#1 L0 hybrid: Submission	$0
1.1.1.2.2.3	Prototype#1 L0 hybrid: manufacturing	$142,796

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 2/20/03	Thu 2/20/03	$95,197	$0	$0	$95,197
3	FNALCont	0%	0 hrs	0 days	Thu 2/20/03	Thu 2/20/03	$47,599	$0	$0	$47,599

Notes
General:
72 needed for entire production. We assume that prototype#1 coincides with pre-production.
The risk should be highly mitigated by the experience gained with the outer hybrid.
Schedule:
For the L0 project we assume that the prototype#1 L0 hybrid are pre-production type.

WBS	Name	Cost

"Prototype#1 L0 hybrid: manufacturing" continued

Notes
The preproduction of L0 hybrid goes with the 2nd round of chips (final chips arrive too late for the pre-production). The pre-production hybrid is submitted for fabrication when the 2nd round of chips (Contingency chips) have been fully evaluated.
The above might change if the 1st round of svx4 chips are fully functional. In this case we could proceed with the fabrication of the L0 hybrid as soon as we are confindent
Cost:
Estimated from LBL Hybrid-Stave-R+D-V3(1).

WBS	Name	Cost
1.1.1.2.2.4	Prototype#1 L0 hybrid Available	$0

Notes
Schedule:
This is 20 days after substrates are available (for mounting and testing).
This order could cover the full production.
These hybrids are meant to be using 2nd round of chip.

WBS	Name	Cost
1.1.1.2.2.5	Prototype#1 L0 hybrid: evaluation and final design	$0

Notes
Labor:
LBL labor only (no FNAL effort)

WBS	Name	Cost
1.1.1.2.2.6	Production L0 Hybrid: final layout	$0

Notes
Labor:
 Labor cost included in the manufacturing

WBS	Name	Cost
1.1.1.2.2.7	Production L0 Hybrid Submission	$0
1.1.1.2.2.8	Production L0 hybrid: manufacturing	$142,796

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 10/21/03	Tue 10/21/03	$95,197	$0	$0	$95,197
3	FNALCont	0%	0 hrs	0 days	Tue 10/21/03	Tue 10/21/03	$47,599	$0	$0	$47,599

Notes
Cost:
Based on "production cost for CDF Run2b Hybrids & stave bus"
V3.0 Mar-24-2002 (C.Haber, LBL)
Total cost is $95,197. Includes yield, labor, overhead and tests

WBS	Name	Cost
1.1.1.2.2.9	Production L0 hybrid available	$0
1.1.1.2.2.10	Production L0 hybrid complete	$0

WBS	Name	Cost
1.1.1.3	Bus Cables	$61,502

Notes

Outer layer Bus cable is a Kapton based cable with signal and power traces to electrically connect the mini-PC to the hybrids. It also provides a ground shield plate to minimise noise pick-up from the sensors and the sensor bias connection.

Runs:
1. Prototype (milestone #1 "electrical stave test")
2. Preproduction (milestone #3 "Preproduction electrical stave test")
3. Production (milestone #4 "Production electrical stave test")

Need **360** bus cables for the project.

Labor:
All LBL labor. No FNAL efforts for the Bus Cable

| 1.1.1.3.1 | Prototype#1 Bus Cable: specs, design and Layout | $0 |

Notes

Schedule:
Submission date coincides with the submission date for the hybrid. Hybrids take longer to fabricate, load and test.
Labor:
All labor is in LBL by physicists (no FNAL labor).

| 1.1.1.3.2 | Prototype#1 Bus Cable Submission | $0 |
| 1.1.1.3.3 | Prototype#1 Bus Cable: Manufacturing | $3,578 |

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$2,385	$0	$0	$2,385
3	FNALCont	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$1,193	$0	$0	$1,193

Notes

General:
We want 2 flavours of these cables (thinner and thicker shield plane)
in order to test the noise pick-up on the silicon.
Cost:
Based on "FY2002 development cost for CDF Run2b Hybrids & stave bus"
V6.0 Mar-24-2002 (C.Haber, LBL)
$2,385 for 20 parts (10 of each flavour). Includes overhead.

| 1.1.1.3.4 | Prototype#1 Bus Cable available | $0 |
| 1.1.1.3.5 | Prototype#1 Bus Cable: Evaluation | $0 |

Notes

Labor:
All labor is done at LBL (no FNAL labor).

WBS	Name	Cost
1.1.1.3.6	Preproduction Bus Cable: layout	$0

Notes

Schedule:
Submission date coincides with the submission date for the preproduction hybrids. Hybrids take longer to fabricate, load and test.
Labor:
All labor is done at LBL (no FNAL labor).

WBS	Name	Cost
1.1.1.3.7	Preproduction Bus Cable Submission	$0
1.1.1.3.8	Preproduction Bus Cable: manufacturing	$9,699

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$6,466	$0	$0	$6,466
3	FNALCont	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$3,233	$0	$0	$3,233

Notes

Cost:
Based on "FY2002 development cost for CDF Run2b Hybrids & stave bus"
V6.0 Mar-24-2002 (C.Haber, LBL)
$6,466 for 60 parts. Includes overhead.

WBS	Name	Cost
1.1.1.3.9	Preproduction Bus Cables available	$0
1.1.1.3.10	Production Bus Cable: final design and layout	$0

Notes

Schedule:
Submission date coincides with the submission date for the preproduction hybrid. Hybrids take longer to fabricate, load and test.
This task is contingency.
Labor:
All labor is in LBL by physicists (no FNAL labor).

WBS	Name	Cost
1.1.1.3.11	Production Bus Cable Sumbission	$0
1.1.1.3.12	Production Bus Cable: manufacturing	$48,225

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Mon 7/28/03	Mon 7/28/03	$32,150	$0	$0	$32,150
3	FNALCont	0%	0 hrs	0 days	Mon 7/28/03	Mon 7/28/03	$16,075	$0	$0	$16,075

Notes

Cost:
Based on "FY2002 development cost for CDF Run2b Hybrids & stave bus"
V6.0 Mar-24-2002 (C.Haber, LBL)
$32,150 for 400 parts. Includes overhead.

Basis of Estimate as of Mon 4/15/02
RunIIbTotal

WBS	Name	Cost
1.1.1.3.13	Production Bus cables available	$0
1.1.1.3.14	Production Bus Cables complete	$0
1.1.1.4	Mini Port Card	$627,838

Notes

The MPC is a BeO hybrid (2"x1.55"). Included in the miniportcards are:
1. components (including tranciever chips), connectors etc.
2. short kapton cables (2 cables, one for power and one for data)
3. cable wing (one kapton cable that connects the top MPC to the bottom stave bus cable)

Runs:
1. Prototype (milestone #1 "electrical stave test")
2. Contingency (milestone #2 "contingency electrical stave test")
3. Preproduction (milestone #3 "preproduction electrical stave test")
4. Production (milestone #4 "Production electrical stave test")

Need **180** Mini Port Cards for the project

WBS	Name	Cost
1.1.1.4.1	Prototype#1 MPC: specs, design and layout	$47,496

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	480 hrs	0 days	Wed 10/10/01	Mon 4/8/02	$24,456		$0	$0	$24,456
9	Elect. Technician	100%	960 hrs	0 days	Wed 10/10/01	Mon 4/8/02	$23,040		$0	$0	$23,040

Notes

General:
Layout should finish together with the Hybrid#1 design.

WBS	Name	Cost
1.1.1.4.2	Prototype#1 MPC submission	$0
1.1.1.4.3	Prototype#1 MPC: manufacturing	$59,179

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 4/8/02	Mon 4/8/02	$45,522		$0	$0	$45,522
3	FNALCont	0%	0 hrs	0 days	Mon 4/8/02	Mon 4/8/02	$13,657		$0	$0	$13,657

Notes

General:
We need 10 mini-PC to sustain the stave prototype effort + test stand needs.
Cost:
- 1/31/2002 estimated cost is (quotation from CPT n. 1-1201-112)
- newer quotation (02/01/2002) :
1. 25 (minimum order) MPC @ 1,168.90 each
2. NRE   4,500.00
3. PigTail (2)   370.00 (per MPC) 185 each
4. cable wing   210.00 (per MPC)

WBS	Name	Cost

"Prototype#1 MPC: manufacturing" continued

Notes

3. miscellenea components   600.00 (per MPC)

45,522.50

We priced the "loading" of 10 MPCs as prototypes.

| 1.1.1.4.4 | | Prototype#1 MPC Available | $0 |

Notes

This has 10 days for assembly after recieving parts and 10 days (2weeks)
for testing. We impose MPC availability 3 weeks before Hybrid #1 is ready for chips. This is our contingency.

| 1.1.1.4.5 | | Prototype#1 MPC: assembly and evaluation | $11,756 |

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	80 hrs	0 days	Wed 6/19/02	Wed 8/14/02	$4,076	$0	$0	$4,076
9	Elect. Technician	100%	320 hrs	0 days	Wed 6/19/02	Wed 8/14/02	$7,680	$0	$0	$7,680
12	Research Associate	50%	160 hrs	0 days	Wed 6/19/02	Wed 8/14/02	$0	$0	$0	$0

| 1.1.1.4.6 | | Prototype#2 MPC: design and layout | $7,916 |

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	80 hrs	0 days	Fri 9/27/02	Thu 10/24/02	$4,076	$0	$0	$4,076
9	Elect. Technician	100%	160 hrs	0 days	Fri 9/27/02	Thu 10/24/02	$3,840	$0	$0	$3,840

Notes

General:
This is a contingency run of MPCs. We would wave this option if the first round of chips+hybrids+MPC is working reasonably well. Cost goes all in the contingency.
Schedule:
Submission date is linked to the submission of the 2nd hybrid prototype.

| 1.1.1.4.7 | | Prototype#2 MPC Submission | $0 |

| 1.1.1.4.8 | | Prototype#2 MPC: manufacturing | $59,179 |

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	FNALCont	0%	0 hrs	0 days	Thu 10/24/02	Thu 10/24/02	$59,179	$0	$0	$59,179

Notes

Cost:
same as for "Prototype#1 MPC: manufacturing".
All in Contingency.

WBS	Name	Cost
1.1.1.4.9	Prototype#2 MPC Available	$0

Notes

This has 10 days for assembly after recieving parts and 10 days (2weeks)
for testing. We impose MPC availability 3 weeks before Hybrid #2 is ready for chips. This is our contingency.

1.1.1.4.10 — Prototype#2 MPC: assembly and evaluation — $11,756

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	80 hrs	0 days	Fri 2/14/03	Thu 4/10/03	$4,076	$0	$0	$4,076
9	Elect. Technician	100%	320 hrs	0 days	Fri 2/14/03	Thu 4/10/03	$7,680	$0	$0	$7,680
12	Research Associate	50%	160 hrs	0 days	Fri 2/14/03	Thu 4/10/03	$0	$0	$0	$0

1.1.1.4.11 — Preproduction MPC: design and layout — $15,832

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	160 hrs	0 days	Fri 2/14/03	Thu 4/10/03	$8,152	$0	$0	$8,152
9	Elect. Technician	100%	320 hrs	0 days	Fri 2/14/03	Thu 4/10/03	$7,680	$0	$0	$7,680

Notes

General:
Linked to the Preproduction hybrid layout.

WBS	Name	Cost
1.1.1.4.12	Preproduction MPC Submission	$0

1.1.1.4.13 — Preproduction MPC: manufacturing — $82,826

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 4/10/03	Thu 4/10/03	$63,712	$0	$0	$63,712
3	FNALCont	0%	0 hrs	0 days	Thu 4/10/03	Thu 4/10/03	$19,114	$0	$0	$19,114

Notes

We order enough to sustain stave preproduction.
24 staves = 30 MPC including some spares and yield.
Cost:
30 MPC (same price as the prototypes)
1. finished substrate   @ 1,168.90 (per MPC)
2. NRE   4,500.00
3. Pig Tails   3,895.00 (for 100 cables, 2 per MPC needed)
4. cable wing   2,250.00 (for 100 wings, 1 per MPC needed)
3. miscellenea components   600.00 (per MPC)

                    63,712.00

WBS	Name	Cost
1.1.1.4.14	Preproduction MPC assembly and evaluation	$15,596

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	80 hrs	0 days	Mon 6/23/03	Mon 8/18/03	$4,076	$0	$0	$4,076
9	Elect. Technician	150%	480 hrs	0 days	Mon 6/23/03	Mon 8/18/03	$11,520	$0	$0	$11,520
12	Research Associate	100%	320 hrs	0 days	Mon 6/23/03	Mon 8/18/03	$0	$0	$0	$0

Notes

This assumes 40 days for producing first substrates plus 20 days for loading and testing. This should also coincide with preproduction hybrids available.

WBS	Name	Cost
1.1.1.4.15	Preproduction MPC Available	$0
1.1.1.4.16	Production MPC: design and layout	$6,678

ID	Resource Name	Units	Work	Delay	Start	Finish
7	Elect. Engineer	25%	40 hrs	0 days	Wed 9/10/03	Tue 10/7/03
11	Mech. Technician-SiDet	100%	160 hrs	0 days	Wed 9/10/03	Tue 10/7/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	$2,038	$0	$0	$2,038
11	Mech. Technician-SiDet	100%	$4,640	$0	$0	$4,640

Notes

Schedule:
Linked to the production hybrid layout.
This task is contingency.

WBS	Name	Cost
1.1.1.4.17	Production MPC go ahead	$0
1.1.1.4.18	Production MPC: manufacturing	$270,634

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 10/7/03	Tue 10/7/03	$208,180	$0	$0	$208,180
3	FNALCont	0%	0 hrs	0 days	Tue 10/7/03	Tue 10/7/03	$62,454	$0	$0	$62,454

Notes

Cost:
We need 180 + spares = 200 MPC:
Production price is (quotation from CPT 1-1201-112)
MPC @ 418.00 each
NRE @ 4,500.00
pigtails are 77.90 per MPC
wing is 22.50 per MPC
components is 500 per MPC
Total is 208,180 $

WBS	Name	Cost
1.1.1.4.19	Production MPC available	$0

Notes

40days for production of first substrates and 20 days for assembly and testing.

| | | 1.1.1.4.20 | | Production MPC: assembly and evaluation | | | $38,990 | | | |

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	200 hrs	0 days	Fri 1/16/04	Fri 6/4/04	$10,190	$0	$0	$10,190
9	Elect. Technician	150%	1,200 hrs	0 days	Fri 1/16/04	Fri 6/4/04	$28,800	$0	$0	$28,800
12	Research Associate	100%	800 hrs	0 days	Fri 1/16/04	Fri 6/4/04	$0	$0	$0	$0

Notes

We need to sustain a rate of 1MPC/day or 5MPC/week.
It should be possible to load and test at least 2/day (10/week).
For production quantity of 200 MPC this is 100 days.

WBS	Name	Cost
1.1.1.4.21	Production MPC complete	$0
1.1.1.5	Junction Port Cards	$331,652

Notes

The JPC is an FR4 board (possibly 2 boards) for signal and power distribution.
JPC includes:
1. components (capacitors, resistors, power filters, FPGA, connectors etc.)

Runs:
1. Prototype#1 (milestone#1 "prototype electrical stave test")
2. Prototype#2 - contingency
2. Preproduction (milestone#3 "preproduction electrical stave test")
3. Production (milestone#4 "production electrical stave test")

Each port card can serve up to 5 mini-PC.
Total number of JPC for the project (inlcuding L0) is **56.**

WBS	Name	Cost

"Junction Port Cards" continued

Notes

Junction Port Cards

Layer	Φ-seg.	MPC (each side)	JPC (Total)
5	30	30	12
5	30		
4	24	24	10
4	24		
3	18	18	8
3	18		
2	12	12	6
2	12		
1	6	6	4
1	6		
0	12	0	16
Total JPC			56

1.1.1.5.1   JPC for milestone #1 $4,076

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	80 hrs	0 days	Wed 5/29/02	Wed 7/24/02	$4,076	$0	$0	$4,076
12	Research Associate	50%	160 hrs	0 days	Wed 5/29/02	Wed 7/24/02	$0	$0	$0	$0

Notes

General:
This card is already done. It was developed for BTeV and can be used for the milestone #1.
Optionally we would like to have also the prototype #1 JPC ready for milestone #1 but it is not mandatory.
This JPC has the same functionality of the final JPC.
Labor:
This is to program the card (firmware).

WBS	Name	Cost
1.1.1.5.2	Prototype#1 JPC: specs, design and layout	$4,076

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	80 hrs	0 days	Tue 4/9/02	Tue 6/4/02	$4,076	$0	$0	$4,076
12	Research Associate	50%	160 hrs	0 days	Tue 4/9/02	Tue 6/4/02	$0	$0	$0	$0

Notes

Schedule:
linked to the end of the mini-PC layout

WBS	Name	Cost
1.1.1.5.3	Prototype#1 JPC Submission	$0
1.1.1.5.4	Prototype#1 JPC: manufacturing	$13,500

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Tue 6/4/02	Tue 6/4/02	$9,000	$0	$0	$9,000
3	FNALCont	0%	0 hrs	0 days	Tue 6/4/02	Tue 6/4/02	$4,500	$0	$0	$4,500

Notes

Cost:
We need 5 for testing chips/hybrids/mpc/cables and staves
$800 each for the FR4 manufacturing (Engineering Estimate).
$1,000 each for miscellanea components (Engineering Estimate)
Total $9,000

WBS	Name	Cost
1.1.1.5.5	Prototype#1 JPC: loading and testing	$5,878

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Wed 7/3/02	Wed 7/31/02	$2,038	$0	$0	$2,038
9	Elect. Technician	100%	160 hrs	0 days	Wed 7/3/02	Wed 7/31/02	$3,840	$0	$0	$3,840
12	Research Associate	50%	80 hrs	0 days	Wed 7/3/02	Wed 7/31/02	$0	$0	$0	$0

Notes

Labor:
loading and testing done at FNAL

WBS	Name	Cost
1.1.1.5.6	Prototype#1 JPC Available	$0

Notes

We impose JPC availability 3 weeks before Hybrid #1 is ready for chips. This is our contingency.
JPC are NOT formally part of our 1st project milestone (stave electrical test) since the stave can be readout without the JPC. However we still would like to have the first JPC available at the time of the 1st milestone to be able to test the concept (measure power dissipation etc.)

WBS	Name	Cost
1.1.1.5.7	Prototype#1JPC: evaluation	$23,512

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	160 hrs	0 days	Thu 8/1/02	Mon 11/25/02	$8,152	$0	$0	$8,152

WBS		Name					Cost			

"Prototype#1JPC: evaluation" continued

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	100%	640 hrs	0 days	Thu 8/1/02	Mon 11/25/02	$15,360	$0	$0	$15,360
12	Research Associate	50%	320 hrs	0 days	Thu 8/1/02	Mon 11/25/02	$0	$0	$0	$0

1.1.1.5.8 — Prototype#2 JPC: design and layout — $2,038

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Fri 10/25/02	Mon 11/25/02	$2,038	$0	$0	$2,038
12	Research Associate	50%	80 hrs	0 days	Fri 10/25/02	Mon 11/25/02	$0	$0	$0	$0

Notes

General:
This is a contingency run of MPCs. We would wave this option if the first round of chips+hybrids+MPC+JPC is working reasonably well. Cost goes all in the contingency.

1.1.1.5.9 — Prototype#2 JPC Submission — $0

1.1.1.5.10 — Prototype#2 JPC: manufacturing — $13,500

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	FNALCont	0%	0 hrs	0 days	Mon 11/25/02	Mon 11/25/02	$13,500	$0	$0	$13,500

Notes

Cost:
We need 5 for testing chips/hybrids/mpc/cables and staves
$800 each for the FR4 manufacturing (Engineering Estimate).
$1,000 each for miscellanea components (Engineering Estimate)
Total $9,000.
All cost is contingency.

1.1.1.5.11 — Prototype#2 JPC: loading and testing — $5,878

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Fri 1/3/03	Thu 1/30/03	$2,038	$0	$0	$2,038
9	Elect. Technician	100%	160 hrs	0 days	Fri 1/3/03	Thu 1/30/03	$3,840	$0	$0	$3,840
12	Research Associate	50%	80 hrs	0 days	Fri 1/3/03	Thu 1/30/03	$0	$0	$0	$0

Notes

Labor:
Loading and testing done at FNAL

WBS	Name	Cost
1.1.1.5.12	Prototype#2 JPC Available	$0

Notes

We impose JPC availability 3 weeks before Hybrid #1 is ready for chips. This is our contingency.
JPC are NOT formally part of our 1st project milestone (stave electrical test) since the stave can be readout without the JPC. However we still would like to have the first JPC available at the time of the 1st milestone to be able to test the concept (measure power dissipation etc.)

WBS	Name	Cost
1.1.1.5.13	Prototype#2: JPC evaluation	$23,512

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	160 hrs	0 days	Fri 1/31/03	Thu 5/22/03	$8,152	$0	$0	$8,152
9	Elect. Technician	100%	640 hrs	0 days	Fri 1/31/03	Thu 5/22/03	$15,360	$0	$0	$15,360
12	Research Associate	50%	320 hrs	0 days	Fri 1/31/03	Thu 5/22/03	$0	$0	$0	$0

WBS	Name	Cost
1.1.1.5.14	Preproduction JPC: design and layout	$6,114

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	120 hrs	0 days	Fri 4/11/03	Thu 5/22/03	$6,114	$0	$0	$6,114
12	Research Associate	50%	120 hrs	0 days	Fri 4/11/03	Thu 5/22/03	$0	$0	$0	$0

Notes

Schedule:
Linked to the MPC preproduction.

WBS	Name	Cost
1.1.1.5.15	Preproduction JPC Submission	$0

WBS	Name	Cost
1.1.1.5.16	Preproduction JPC: manufacturing	$33,750

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 5/22/03	Thu 5/22/03	$22,500	$0	$0	$22,500
3	FNALCont	0%	0 hrs	0 days	Thu 5/22/03	Thu 5/22/03	$11,250	$0	$0	$11,250

Notes

General:
We need 10 (preproduction)+5 for testing setups including spares.
Cost:
$600 each for FR4 boards
$900 each for components and loading and testing (Engineering Estimate).
Total $22,500

WBS	Name	Cost
1.1.1.5.17	Preproduction JPC: testing	$11,756

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	80 hrs	0 days	Mon 6/23/03	Mon 8/18/03	$4,076	$0	$0	$4,076
9	Elect. Technician	100%	320 hrs	0 days	Mon 6/23/03	Mon 8/18/03	$7,680	$0	$0	$7,680
12	Research Associate	50%	160 hrs	0 days	Mon 6/23/03	Mon 8/18/03	$0	$0	$0	$0

WBS	Name	Cost

"Preproduction JPC: testing" continued

Notes

Labor:
Loading and basic testing done on a outside company.
This is FNAL labor for more extensive testing of the card.

1.1.1.5.18	Preproduction JPC available	$0

Notes

Lag time of 20days for loading and testing.

1.1.1.5.19				Preproduction JPC: evaluation		$17,634			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	120 hrs	0 days	Tue 7/22/03	Tue 10/14/03	$6,114	$0	$0	$6,114
9	Elect. Technician	100%	480 hrs	0 days	Tue 7/22/03	Tue 10/14/03	$11,520	$0	$0	$11,520
12	Research Associate	50%	240 hrs	0 days	Tue 7/22/03	Tue 10/14/03	$0	$0	$0	$0

1.1.1.5.20				Production JPC: design and layout		$2,038			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Wed 10/8/03	Tue 11/4/03	$2,038	$0	$0	$2,038
12	Research Associate	50%	80 hrs	0 days	Wed 10/8/03	Tue 11/4/03	$0	$0	$0	$0

Notes

Schedule:
Linked to the MPC production layout.
This task is contingency.

1.1.1.5.21	Production JPC go ahead	$0

1.1.1.5.22	Production JPC: manufacturing	$135,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 11/4/03	Tue 11/4/03	$90,000	$0	$0	$90,000
3	FNALCont	0%	0 hrs	0 days	Tue 11/4/03	Tue 11/4/03	$45,000	$0	$0	$45,000

Notes

General:
We need 56 working boards + spares = 60 boards (15 have been made already during pre-production).
Cost:
$600 each for FR4 substrate (Engineering Estimate)
$900 each for components, loading and testing (Engineering Estimate).
Total $90,000

WBS	Name					Cost			
1.1.1.5.23	Production JPC: testing					$29,390			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	200 hrs	0 days	Fri 12/5/03	Thu 5/6/04	$10,190	$0	$0	$10,190
9	Elect. Technician	100%	800 hrs	0 days	Fri 12/5/03	Thu 5/6/04	$19,200	$0	$0	$19,200
12	Research Associate	50%	400 hrs	0 days	Fri 12/5/03	Thu 5/6/04	$0	$0	$0	$0

Notes

Labor:
Loading and basic testing done on a outside company.
This is FNAL labor for more extensive testing of the card.
Schedule:
we should test 3 boards/week = 16 weeks= 80d

1.1.1.5.24	Production JPC Available	$0

Notes

Schedule:
Lag time of 40 days includes 20d for getting the first boards tested.

1.1.1.5.25	Production JPC Complete	$0

1.1.1.6	Junction Cards	$135,934

Notes

This is a passive card (or just a simple connector) that allows the cable transition from inside to outside of the tracking volume (it's roughly located where we now have the Junction Cards for runiia). It should not have any components but it could have some power filtering.
This card is linked to the finilization of the mechanical structure which dictates dimensions and support. This is the reason for having 2 prototypes.
We conservatively assume we need a card and not just connectors.

Runs:
1. Prototype#1 (just functionality)
2. Prototype#2 (specified for the final mechanical design)
3. Production

1 JC per stave + L0
Need **180** (Outer) + **24** (L0) = **204** Junction Cards for the project.

1.1.1.6.1	Prototype#1 JC: specs, design and layout					$7,495			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	100 hrs	0 days	Wed 6/5/02	Wed 8/14/02	$5,095	$0	$0	$5,095
9	Elect. Technician	25%	100 hrs	0 days	Wed 6/5/02	Wed 8/14/02	$2,400	$0	$0	$2,400
12	Research Associate	50%	200 hrs	0 days	Wed 6/5/02	Wed 8/14/02	$0	$0	$0	$0

WBS	Name	Cost

"Prototype#1 JC: specs, design and layout" continued

Notes
Schedule:
Linked to the MPC and JPC layout.

1.1.1.6.2	Prototype#1 JC Submission	$0

1.1.1.6.3	Prototype#1 JC: manufacturing	$9,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Wed 8/14/02	Wed 8/14/02	$6,000	$0	$0	$6,000
3	FNALCont	0%	0 hrs	0 days	Wed 8/14/02	Wed 8/14/02	$3,000	$0	$0	$3,000

Notes
General:
We need 1 per stave. So we would build 10 as prototypes.
Cost:
$600 per FR4 board and components (Engineering Estimate)

1.1.1.6.4	Prototype#1 JC: Loading and testing	$5,878

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Fri 9/13/02	Thu 10/10/02	$2,038	$0	$0	$2,038
9	Elect. Technician	100%	160 hrs	0 days	Fri 9/13/02	Thu 10/10/02	$3,840	$0	$0	$3,840
12	Research Associate	50%	80 hrs	0 days	Fri 9/13/02	Thu 10/10/02	$0	$0	$0	$0

Notes
Labor:
this is the estimate for loading and testing.

1.1.1.6.5	Prototype#1 JC Available	$0

Notes
We impose JPC availability 3 weeks before Hybrid #1 is ready for chips. This is our contingency.
JPC are NOT formally part of our 1st project milestone (stave electrical test) since the stave can be readout without the JPC. However we still would like to have the first JPC available at the time of the 1st milestone to be able to test the concept (measure power dissipation etc.)

1.1.1.6.6	Prototype#1 JC: evaluation	$3,057

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	60 hrs	0 days	Fri 10/11/02	Mon 11/25/02	$3,057	$0	$0	$3,057
12	Research Associate	50%	120 hrs	0 days	Fri 10/11/02	Mon 11/25/02	$0	$0	$0	$0

WBS	Name	Cost
1.1.1.6.7	Prototype#2 JC: design	$2,038

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Mon 12/16/02	Wed 1/22/03	$2,038	$0	$0	$2,038
12	Research Associate	50%	80 hrs	0 days	Mon 12/16/02	Wed 1/22/03	$0	$0	$0	$0

Notes

Schedule:
Linked to the finilization of the mechanical structure design.

WBS	Name	Cost
1.1.1.6.8	Prototype#2 JC Submission	$0
1.1.1.6.9	Prototype#2 JC: manufacturing	$9,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Wed 1/22/03	Wed 1/22/03	$6,000	$0	$0	$6,000
3	FNALCont	0%	0 hrs	0 days	Wed 1/22/03	Wed 1/22/03	$3,000	$0	$0	$3,000

Notes

We need 1 per stave. So we would build 10 as prototypes.
Cost:
$600 per FR4 board and components (Engineering Estimate)

WBS	Name	Cost
1.1.1.6.10	Prototype#2 JC: Loading and testing	$5,878

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Thu 2/20/03	Wed 3/19/03	$2,038	$0	$0	$2,038
9	Elect. Technician	100%	160 hrs	0 days	Thu 2/20/03	Wed 3/19/03	$3,840	$0	$0	$3,840
12	Research Associate	50%	80 hrs	0 days	Thu 2/20/03	Wed 3/19/03	$0	$0	$0	$0

Notes

Labor:
this is the estimate for loading and testing.

WBS	Name	Cost
1.1.1.6.11	Prototype#2 JC Available	$0
1.1.1.6.12	Prototype#2 JC evaluation	$2,038

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Tue 7/22/03	Mon 8/18/03	$2,038	$0	$0	$2,038
12	Research Associate	50%	80 hrs	0 days	Tue 7/22/03	Mon 8/18/03	$0	$0	$0	$0

WBS	Name	Cost
1.1.1.6.13	Production JC: design	$2,038

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	40 hrs	0 days	Wed 11/5/03	Thu 12/4/03	$2,038	$0	$0	$2,038
12	Research Associate	50%	80 hrs	0 days	Wed 11/5/03	Thu 12/4/03	$0	$0	$0	$0

Notes

Schedule:
Layout can start when the MPC, JPC, cables and mechanical structure have been finalized.

WBS	Name	Cost
1.1.1.6.14	Production JC go ahead	$0
1.1.1.6.15	Production JC: manufacturing	$66,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 12/4/03	Thu 12/4/03	$44,000	$0	$0	$44,000
3	FNALCont	0%	0 hrs	0 days	Thu 12/4/03	Thu 12/4/03	$22,000	$0	$0	$22,000

Notes

Cost:
Need 204 + spares = 220
$200 for FR4 boards, and components (Engineering Estimate)
Total $44,000

WBS	Name	Cost
1.1.1.6.16	Production JC: Loading and testing	$23,512

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	160 hrs	0 days	Fri 1/16/04	Thu 5/6/04	$8,152	$0	$0	$8,152
9	Elect. Technician	100%	640 hrs	0 days	Fri 1/16/04	Thu 5/6/04	$15,360	$0	$0	$15,360
12	Research Associate	50%	320 hrs	0 days	Fri 1/16/04	Thu 5/6/04	$0	$0	$0	$0

Notes

Labor:
this is the estimate for loading and testing.

WBS	Name	Cost
1.1.1.6.17	Production JC Available	$0
1.1.1.6.18	Production JC Complete	$0
1.1.1.7	Cables	$320,541

Notes

We will replace all cables going from the silicon detector to the DAQ and Power Supplies racks.
There are 2 sets of these cables:
- from the mini Port Card (end of stave) to the Junction Port Card

WBS	Name	Cost

"Cables" continued

Notes
- from the Junction Port Card to the racks.

1.1.1.7.1	Cables from MPC to JPC	$173,371

Notes

These are in reality 2 sets of cables.
One set from the end of the MPC pig-tail to the Junction card (signal + power) and a second set from the Junction card to the Junction Portcard (signal + power).
First set is about 3 feet long
Second set is about 9 feet long.
The Junction Card connects the 2 sets.
In production we will need 180*2 = **360** sets of cables.

1.1.1.7.1.1 Finalize cables and connectors for milestone#1 $4,076

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	80 hrs	0 days	Tue 2/19/02	Mon 4/15/02	$4,076		$0	$0	$4,076
12	Research Associate	50%	160 hrs	0 days	Tue 2/19/02	Mon 4/15/02	$0		$0	$0	$0

Notes

These are not the same cables we will use in the final version since for milestone #1 we are not using the JPC necessarily.

1.1.1.7.1.2 Procure cables for milestone#1 $7,500

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$5,000		$0	$0	$5,000
3	FNALCont	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$2,500		$0	$0	$2,500

Notes

These are not necessarely the cables from the MPC to the JPC since the JPC may not be part of milestone#1. These are just "functional cables" for milestone #1
Need 5 sets (4m long) with connectors for testing staves for milestone#1
Cost:
$1,000 per set (Engineering Estimate)
Total $5,000

1.1.1.7.1.3 cable testing for milestone #1 $1,920

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	50%	80 hrs	0 days	Wed 6/12/02	Wed 7/10/02	$1,920		$0	$0	$1,920

1.1.1.7.1.4	MPC-JPC Cables available for milestone#1	$0

WBS	Name	Cost
1.1.1.7.1.5	Finalize production cables and connectors	$8,994

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	120 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$6,114		$0	$0	$6,114
9	Elect. Technician	25%	120 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$2,880		$0	$0	$2,880
12	Research Associate	50%	240 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$0		$0	$0	$0

Notes

Schedule:
After the first DAQ chain has been tested, we can finilize the cables and connectors.
These are now the prototype/preproduction cables.

WBS	Name	Cost
1.1.1.7.1.6	MPC-JPC Production Cables and Connectors Finalized	$0
1.1.1.7.1.7	Procure Cables for milestone #3	$21,551

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Fri 5/23/03	Fri 5/23/03	$14,367		$0	$0	$14,367
3	FNALCont	0%	0 hrs	0 days	Fri 5/23/03	Fri 5/23/03	$7,184		$0	$0	$7,184

Notes

General:
These are the prototype/preproduction cables.
Cost:
Based on quotation XXXX
1. **Signal cable:**
we'll buy spools of twisted pairs @ $263.00 for 1000 feet. One signal cable will have 25 pairs. Each complete cable set per MPC (to and from the JC) is 25*(3'+9')=300 feet at 0.263 per foot = $80 per set of signal cables (covers 1 MPC worth).
Termination of signal cables is done outside FNAL and price depends on quantity:
terminating 1-9 cables is $144 per termination (4 terminations per set)
terminating 10-24 cables is $109 per termination
Total price per set (1 MPC worth) is then $80 + $(4*109) = $516 per set.

2. **Power Cable:**
For both power cables going to and coming from the Junction card the price is the same as for production.
$70 per set.

3. **HV cable:**
we assume that the HV cable is the same as the Signal Cable. This is achieved by simply adding 4 more conductors to the signal cable.
Total to be added is 4*(3'+9')=48 feet at 0.263 per foot = $12.624 per set of HV cable (covers 1 MPC worth). Termination costs are included already in the signal cables.

In preproduction we'll make 24 MPC worth of such cables.
Total cost is is 24*(70+516+12.624) = 14.367 K$

WBS	Name	Cost
1.1.1.7.1.8	cable testing	$1,920

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	50%	80 hrs	0 days	Tue 7/22/03	Mon 8/18/03	$1,920	$0	$0	$1,920

Notes

Labor:
Termination and testing will be done at the company. Here is just considered the final check at FNAL.

1.1.1.7.1.9	MPC-JPC preproduction cables available	$0

1.1.1.7.1.10	Production go ahead on MPC -JPC cables	$0

Notes

Schedule:
linked to the test on the preproduction DAQ chain.

1.1.1.7.1.11	Procurement of MPC-JPC cables	$121,650

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 10/14/03	Tue 10/14/03	$81,100	$0	$0	$81,100
3	FNALCont	0%	0 hrs	0 days	Tue 10/14/03	Tue 10/14/03	$40,550	$0	$0	$40,550

Notes

Cost:
Based on quotations

Production costs is (test will be done at FNAL):
1. signal cable (MPC to JC) $ 8.113 per foot
   cable termination (2) $77.00 per termination (+connector+labor)
2. signal cable (JC to JPC) $ 8.113 per foot
   cable termination (2) $77.00 per termination (+connector+labor)
3. Power cable (MPC to JC) $30.0 per cable (includes termination, labor and connectors)
4. Power cable (JC to JPC) $40.0 per cable (includes termination, labor and connectors)
5. HV (JC to JPC) included in the signal cables as 4 extra conductors
6. HV (MPC to JC)   included in the signal cables as 4 extra conductors

Total cost is (180 sets needed + spares = 200):
200 *((9'+3')*8.113 + 77 * 4) + 70) = 200*405.356 = $ 81,071.20

1.1.1.7.1.12	cable testing	$5,760

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	50%	240 hrs	0 days	Fri 12/12/03	Thu 3/18/04	$5,760	$0	$0	$5,760

Notes

Labor:
Basic tests will be done by the manufacturer. At FNAL just the final tests prior to intallation.

WBS	Name	Cost

"cable testing" continued

Notes
Schedule:
A leg time of 40 days has been added from the time of procurement.

1.1.1.7.1.13	MPC-JPC production cables available	$0

1.1.1.7.1.14	Production cables complete	$0

Notes
40days lag time allowed for adding connectors and testing.
We need 200 sets for the detector.

1.1.1.7.2	Cables from JPC to Crates	$147,170

Notes
There are 4 types of cable:
1. signal (JPC to FTM/FIB)
2. power (JPC to Power Supply)
3. High Voltage (JPC to Power Supply)
4. sensing wire for the LV power (JPC to Power Supply)
The High Voltage cable and sense cable could be the same as the Power cable (all going to Power Supplies).
Total length is about 60 feet.

1.1.1.7.2.1			Finalize cables and connectors for milestone #1			$4,076			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	80 hrs	0 days	Tue 2/19/02	Mon 4/15/02	$4,076		$0	$0	$4,076
12	Research Associate	50%	160 hrs	0 days	Tue 2/19/02	Mon 4/15/02	$0		$0	$0	$0

Notes
Schedule:
linked to milestone #1. These are not the final cables, just same functionality

1.1.1.7.2.2			Procure cables for milestone #1			$7,500			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Tue 4/16/02	Tue 4/16/02	$5,000		$0	$0	$5,000
3	FNALCont	0%	0 hrs	0 days	Tue 4/16/02	Tue 4/16/02	$2,500		$0	$0	$2,500

Notes
Need 5 sets with connectors for milestone #1
Cost:
$1,000 per set (Engineering Estimate)
Total $5,000

WBS	Name	Cost
1.1.1.7.2.3	cable testing for milestone #1	$1,920

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	50%	80 hrs	0 days	Wed 6/12/02	Wed 7/10/02	$1,920	$0	$0	$1,920

Notes

Labor:
This is for terminating cables and testing.

WBS	Name	Cost
1.1.1.7.2.4	JPC-Crates cables available for milestone #1	$0
1.1.1.7.2.5	Finalize production cables and connectors	$8,994

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	120 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$6,114	$0	$0	$6,114
9	Elect. Technician	25%	120 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$2,880	$0	$0	$2,880
12	Research Associate	25%	120 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$0	$0	$0	$0

Notes

Schedule:
After the first DAQ chain has been tested, we can finilize the cables and connectors.
These are now the prototype/preproduction cables.

WBS	Name	Cost
1.1.1.7.2.6	JPC-Crates Production Cables and Connectors Finilized	$0
1.1.1.7.2.7	Procure Cables for milestone #3	$15,750

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 2/20/03	Thu 2/20/03	$10,500	$0	$0	$10,500
3	FNALCont	0%	0 hrs	0 days	Thu 2/20/03	Thu 2/20/03	$5,250	$0	$0	$5,250

Notes

These are prototype/preproduction cables to be used fro the preproduction milestone.
Cost:
Based on the price of the IIa project.
Cost includes terminated cables + connectors + Labor.
We assume here all separate cables.
Need 5 sets for preproduction + 2 spare = 7 sets
6 cables for signals (5 data, 1 is control and clocks), $170*6 = $1,020 per JPC
1 cable for HV, $50 per JPC
1 cable for power $260 per JPC
1 cable for sensing $170 per JPC

Total is $1,500 per JPC set. With we have 10.5 K$

WBS		Name					Cost			

1.1.1.7.2.8 — cable testing — $1,920

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	50%	80 hrs	0 days	Fri 4/18/03	Thu 5/15/03	$1,920	$0	$0	$1,920

Notes

Labor:
this is just for testing cables (no termination required)

1.1.1.7.2.9 — Preproduction JPC-Crates cables available — $0

1.1.1.7.2.10 — Production go ahead on JPC-Crates cables — $0

1.1.1.7.2.11 — Procurement of JPC cables — $101,250

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 9/16/03	Tue 9/16/03	$67,500	$0	$0	$67,500
3	FNALCont	0%	0 hrs	0 days	Tue 9/16/03	Tue 9/16/03	$33,750	$0	$0	$33,750

Notes

Cost:
Need 40 sets of these cables.

Cost:
Price estimated from the IIa project:
Price includes terminated cables + connectors + Labor.
6 cables for signals (5 data, 1 is control and clocks), $170*6 = $1,020 per JPC
1 cable for HV, $50 ??? per JPC
1 cable for power $260 per JPC
1 cable for sensing $170 per JPC

Total is $1,500 per JPC. With 40 (needed) + 5 spares we have 67.5 K$

1.1.1.7.2.12 — cable testing — $5,760

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	50%	240 hrs	0 days	Wed 11/12/03	Thu 2/19/04	$5,760	$0	$0	$5,760

Notes

Labor:
this is just for testing cables (no termination required)

1.1.1.7.2.13 — Production JPC cables available — $0

WBS	Name	Cost
1.1.1.7.2.14	Production JPC cables complete	$0

Notes

40days lag time allowed for adding connectors and testing.
We need 40 sets for the detector.

WBS	Name	Cost
1.1.1.8	FTMs	$183,707

Notes

New FTMs are needed because we are not using optical transmitter/receiver for the data.
Old FTMs can be easily made "new" by simply substituting the old optical tx/rx part with standard tx/rx.
Here we estimate the highest price of making a complete new card.
There is one FTM every 2 JPC.

Runs:
1. Prototype
3. Production

Need **23** FTM for the project

WBS	Name	Cost
1.1.1.8.1	modify existing FTM for milestone #1	$408

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	5%	8 hrs	0 days	Tue 3/19/02	Mon 4/15/02	$408	$0	$0	$408
12	Research Associate	25%	40 hrs	0 days	Tue 3/19/02	Mon 4/15/02	$0	$0	$0	$0

Notes

General:
this is just a modification of one existing FTM card, replacing the optical tx/rx part with a copper conventional one.

WBS	Name	Cost
1.1.1.8.2	FTM ready for milestone #1	$0
1.1.1.8.3	Prototype FTM: spec, design and layout	$22,064

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	100%	320 hrs	0 days	Fri 11/15/02	Thu 1/23/03	$16,304	$0	$0	$16,304
9	Elect. Technician	75%	240 hrs	0 days	Fri 11/15/02	Thu 1/23/03	$5,760	$0	$0	$5,760

Notes

Schedule:
This is intended to be the final FTM design (i.e. preproduction) and comes at the end of the testing of the prototype DAQ chain.

WBS	Name	Cost
1.1.1.8.4	Prototype FTM Submission	$0
1.1.1.8.5	Prototype FTM: procurement	$39,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 1/23/03	Thu 1/23/03	$30,000	$0	$0	$30,000

Basis of Estimate as of Mon 4/15/02
RunIIbTotal

WBS	Name	Cost

"Prototype FTM: procurement" continued

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	FNALCont	0%	0 hrs	0 days	Thu 1/23/03	Thu 1/23/03	$9,000	$0	$0	$9,000

Notes

Need 10 cards as preproduction.
Cost:
based on the price of the IIa FTM card.
$3,000 per board (includes components, assembling, connectors etc.).

1.1.1.8.6 Prototype FTM: assembling and evaluation $8,206

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	10%	48 hrs	0 days	Fri 3/21/03	Fri 6/13/03	$2,446	$0	$0	$2,446
9	Elect. Technician	50%	240 hrs	0 days	Fri 3/21/03	Fri 6/13/03	$5,760	$0	$0	$5,760
12	Research Associate	50%	240 hrs	0 days	Fri 3/21/03	Fri 6/13/03	$0	$0	$0	$0

Notes

Labor:
assembling labor is costed in the manufacturing.
Labor here is just for testing the card with the DAQ system.

1.1.1.8.7 Prototype FTM available $0

1.1.1.8.8 Production FTM: spec, design and layout $22,064

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	100%	320 hrs	0 days	Mon 6/16/03	Mon 8/11/03	$16,304	$0	$0	$16,304
9	Elect. Technician	75%	240 hrs	0 days	Mon 6/16/03	Mon 8/11/03	$5,760	$0	$0	$5,760

1.1.1.8.9 Production go ahead on FTMs $0

Notes

Schedule:
Linked to the production go-ahead for cables.

1.1.1.8.10 Production: procurement $78,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Tue 9/16/03	Tue 9/16/03	$60,000	$0	$0	$60,000
3	FNALCont	0%	0 hrs	0 days	Tue 9/16/03	Tue 9/16/03	$18,000	$0	$0	$18,000

Notes

Cost:
based on FTM cost for IIa.

WBS	Name	Cost

"Production: procurement" continued

Notes

$2,000 per board (includes components, assembling, connectors etc.).
Need 23 + spares = 30 FTM.
Total $60,000

| | 1.1.1.8.11 | | Production: assembling and evaluation | | | | $13,966 | | | |

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	10%	48 hrs	0 days	Wed 10/15/03	Thu 1/22/04	$2,446	$0	$0	$2,446
9	Elect. Technician	100%	480 hrs	0 days	Wed 10/15/03	Thu 1/22/04	$11,520	$0	$0	$11,520
12	Research Associate	25%	120 hrs	0 days	Wed 10/15/03	Thu 1/22/04	$0	$0	$0	$0

Notes

Labor:
assembling labor is costed in the manufacturing.
Labor here is just for testing the card with the DAQ system.

| | 1.1.1.8.12 | | Production FTM available | | | | $0 | | | |

| | 1.1.1.8.13 | | Production FTMs complete | | | | $0 | | | |

Notes

40days lag time allowed for adding connectors and testing.
We need 40 sets for the detector.

| | 1.1.1.9 | | DAQ Testing & Readiness | | | | $173,748 | | | |

Notes

Cost:
Here is the cost of all electrical testing (M&S) at FNAL. Includes DAQ stands, Burn-in stations, computers, miscellanea PC boards and material, cables, tools and instrument (oscilloscope etc. is needed).
added 50% contingency

| | 1.1.1.9.1 | | Testing of Prototype DAQ Chain | | | | $66,114 | | | |

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Wed 8/21/02	Wed 8/21/02	$40,000	$0	$0	$40,000
3	FNALCont	0%	0 hrs	0 days	Wed 8/21/02	Wed 8/21/02	$20,000	$0	$0	$20,000
7	Elect. Engineer	25%	120 hrs	0 days	Thu 8/22/02	Thu 11/14/02	$6,114	$0	$0	$6,114
12	Research Associate	100%	480 hrs	0 days	Thu 8/22/02	Thu 11/14/02	$0	$0	$0	$0

Notes

Test begins when 1st prototype electrical stave is available.
These are specific tests aimed at understanding the functionality of the stave concept.
Cost:

WBS	Name	Cost

"Testing of Prototype DAQ Chain" continued

Notes

Here is calculated the cost of all electrical testing (M&S) at FNAL up to this phase.
Includes upgrade to DAQ stands and Burn-in stations, new computers, bench power supplies, miscellanea boards and material, cables, tools and instruments.
Most of the above equipment is already available from the IIa effort. This is moslty to upgrade and modify what is already there.
Labor:
This is the labor specifically assigned to understand the DAQ issues and get all the testing equipment ready for production. It is in parallel with the labor assigned to test chips, hybrids, modules and staves.

1.1.1.9.2 — Testing of Preproduction DAQ chain — $107,634

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 9/16/03	Tue 9/16/03	$60,000	$0	$0	$60,000
3	FNALCont	0%	0 hrs	0 days	Tue 9/16/03	Tue 9/16/03	$30,000	$0	$0	$30,000
7	Elect. Engineer	25%	120 hrs	0 days	Wed 9/17/03	Thu 12/11/03	$6,114	$0	$0	$6,114
9	Elect. Technician	100%	480 hrs	0 days	Wed 9/17/03	Thu 12/11/03	$11,520	$0	$0	$11,520
12	Research Associate	50%	240 hrs	0 days	Wed 9/17/03	Thu 12/11/03	$0	$0	$0	$0

Notes

Test begin when 1st preproduction stave is available.
All various pieces should be ordered for production quantities based on this final test.
Decision to proceed with ordering production quantities parts is marked by milestone #4
Cost:
Here is the cost of further electrical testing (M&S) equipment at FNAL. Includes DAQ stands, Burn-in stations, computers, miscellanea PC boards and material, cables, tools and instrument (oscilloscope etc. if needed).
added 50% contingency

1.1.1.9.3 — Milestone#4: DAQ Production Go-Ahead — $0

Notes

This date marks the end of all decisions regarding ordering production quantities for all DAQ parts.

1.1.1.10 — Power Supply system — $772,200

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	FNALCont	0%	0 hrs	0 days	Tue 4/2/02	Tue 4/2/02	$0	$0	$0	$0

Notes

We need a new power supply system in order to provide power to the detector.
Main characteristics are to provide power separately for the chip (AVDD,DVDD0, MPC,JPC and two HV line per stave (one per each side).
Channel count for the above scheme is provided in the table.

WBS	Name	Cost

"Power Supply system" continued

Notes

Power Supply

Layer	R/O Chains	JPC	LV	HV
5	60	12	192	120
4	48	10	154	96
3	36	8	116	72
2	24	6	78	48
1	12	4	48	24
0	72	16	232	72
TOTAL	**252**	**56**	**820**	**432**

1.1.1.10.1   Selection of New Supplies $0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	NonFnal Labor	25%	80 hrs	0 days	Tue 4/2/02	Tue 5/28/02	$0	$0	$0	$0

Notes

Search the market for available solutions.
Labor:
Done at INFN-Padova.
Estimated in 0.25 FTE

1.1.1.10.2   Procure sample supplies $20,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	ItalyEQ	0%	0 hrs	0 days	Tue 5/28/02	Tue 5/28/02	$20,000	$0	$0	$20,000

Notes

We need to have these ready to use for milestone#1.
Cost:
Based on CAEN quotation:
1. Crate $10,000
2. module A1551-HV $3,100
3. module A1518-LV $2,900
4 cables, connectors, load box, miscellanea material $1,500
Total $17,500 + $2,500 contingency = $20,000

WBS	Name	Cost
1.1.1.10.3	Test general features of Power supplies	$0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	NonFnal Labor	100%	480 hrs	0 days	Thu 8/22/02	Thu 11/14/02	$0	$0	$0	$0

Notes

These tests are aimed at checking that the functionality of the new system is compatible with the runiib deisgn and needs.
Labor:
Done at INFN-Padova. No FNAL labor
Estimated labor 1.0 FTE

WBS	Name	Cost
1.1.1.10.4	Evaluate power supplies	$8,994

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	120 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$6,114	$0	$0	$6,114
9	Elect. Technician	25%	120 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$2,880	$0	$0	$2,880
16	NonFnal Labor	50%	240 hrs	0 days	Fri 11/15/02	Thu 2/20/03	$0	$0	$0	$0

Notes

Schedule:
Sample power supplies will be used for milestone#1
Labor:
This is the final System test with the electrical stave and is done at FNAL.
1. Elect. Engineer (25%) support
2. Elect. Technician (25%) support
3. Elect. Technician (50%) from INFN-Padova

WBS	Name	Cost
1.1.1.10.5	Final Decision on Power Supply System	$0

Notes

This milestone marks the decision point on the power supply system.

WBS	Name	Cost
1.1.1.10.6	Patch Panel: design and prototyping	$7,934

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 12/11/03	Thu 12/11/03	$2,000	$0	$0	$2,000
3	FNALCont	0%	0 hrs	0 days	Thu 12/11/03	Thu 12/11/03	$2,000	$0	$0	$2,000
7	Elect. Engineer	10%	32 hrs	0 days	Fri 12/12/03	Thu 2/19/04	$1,630	$0	$0	$1,630
9	Elect. Technician	30%	96 hrs	0 days	Fri 12/12/03	Thu 2/19/04	$2,304	$0	$0	$2,304
12	Research Associate	50%	160 hrs	0 days	Fri 12/12/03	Thu 2/19/04	$0	$0	$0	$0

Notes

The patch panel is necessary to map the HV and LV power supply channels to the JPCs.
Cost:
based on physicist estimate.
$2,000 per panel including connectors, terminations, patch panel cabling etc.
Protoype is 1 panel.

WBS	Name	Cost

"Patch Panel: design and prototyping" continued

Notes

100% contingency applied.
Labor:
1. Research Associate (40%)
2. elect. technician (30%)
3. elect. engineer (10%)

WBS	Name	Cost
1.1.1.10.7	Power supply Production go ahead	$0

1.1.1.10.8		Power Supply: procurement	$683,000				

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 2/19/04	Thu 2/19/04	$333,000	$0	$0	$333,000
3	FNALCont	0%	0 hrs	0 days	Thu 2/19/04	Thu 2/19/04	$150,000	$0	$0	$150,000
4	ItalyEQ	0%	0 hrs	0 days	Thu 2/19/04	Thu 2/19/04	$200,000	$0	$0	$200,000

Notes

Cost:
Based on a budgetary CAEN quote for off the shelf power supplies suitable for our system.
Total number of channels are ~500 HV and ~900 LV including spares.
Total cost $500,000 and includes crates.
Contingency is 30%
$33K added for indirect costs (16.6% on the first $200K)

1.1.1.10.9	Production Power Supply Available	$0

1.1.1.10.10		Power Supply: Testing	$21,120				

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	100%	880 hrs	0 days	Mon 6/14/04	Tue 11/16/04	$21,120	$0	$0	$21,120
12	Research Associate	25%	220 hrs	0 days	Mon 6/14/04	Tue 11/16/04	$0	$0	$0	$0
16	NonFnal Labor	20%	176 hrs	0 days	Mon 6/14/04	Tue 11/16/04	$0	$0	$0	$0

Notes

Labor:
Production tests will be done at FNAL.
this is estimated from the runiia experience
We assume that 2 power supply modules can be tested per day.
~110 modules needed.

1.1.1.10.11	Power Supply Complete	$0

WBS	Name	Cost
1.1.1.10.12	Patch Panel: production	$31,152

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 4/15/04	Thu 4/15/04	$15,000	$0	$0	$15,000
3	FNALCont	0%	0 hrs	0 days	Thu 4/15/04	Thu 4/15/04	$15,000	$0	$0	$15,000
9	Elect. Technician	10%	48 hrs	0 days	Fri 4/16/04	Mon 7/12/04	$1,152	$0	$0	$1,152

Notes

Cost:
Based on Physicist estimate of 1.5K$/panel for production.
Need 8 panels + 2 spares = 15K$
Added 100% contingency.
Labor:
This is for testing the panels (parts and assembly included in the cost).
1. Elect. Technician (10%) ~ 1week of work

WBS	Name	Cost
1.1.1.11	SVT upgrade	$382,200

Notes

The SVT is part of the trigger system for CDF. The upgrade consists in making more of boards already existing and/or modifying existing boards.
University of Chicago and INFN-Pisa are providing engineering time, labor and equipment for these parts.

WBS	Name	Cost
1.1.1.11.1	Upgrade SVT trackfitters	$273,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 12/11/03	Thu 12/11/03	$210,000	$0	$0	$210,000
3	FNALCont	0%	0 hrs	0 days	Thu 12/11/03	Thu 12/11/03	$63,000	$0	$0	$63,000

Notes

It is not yet clear whether we need to re-build these boards or the present functionality will suffice for IIb. We assume we have to re-build them.
Cost:
based on the cost of the present boards for IIa.
Total cost is 210K$ for 17 track fitter boards which include spares.
Labor:
Costed in the board except for testing.
Testing provided by U. Chicago.
No FNAL labor.

WBS	Name	Cost
1.1.1.11.2	Upgrade SVT merger boards	$109,200

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 12/11/03	Thu 12/11/03	$84,000	$0	$0	$84,000
3	FNALCont	0%	0 hrs	0 days	Thu 12/11/03	Thu 12/11/03	$25,200	$0	$0	$25,200

Notes

We need to build an additional 12 merger
Cost:

WBS	Name	Cost

"Upgrade SVT merger boards" continued

Notes

based on the cost of the present boards for IIa.
Total cost is 84k$ for 12 additional merger boards.
Spares are the same as for IIa.
Labor:
Costed on the board cost except for testing.
Testing provided by INFN-Pisa.

1.1.2	Sensors	$2,296,246

Notes

The table below summarises the type and number of sensors needed:

WBS	Name	Cost

"Sensors" continued

Notes

Silicon Sensors

Layer	Type	Φ-seg.	Z-seg.	Length	Width	Pitch	Total
5	A	30	6	96.4	40.5	75/37.5	360
5	A	30	6	96.4	40.5	75/37.5	360
4	A	24	6	96.4	40.5	75/37.5	288
4	2.5^o	24	6	96.4	43.1	80/40	288
3	A	18	6	96.4	40.5	75/37.5	216
3	2.5^o	18	6	96.4	43.1	80/40	216
2	A	12	6	96.4	40.5	75/37.5	144
2	2.5^o	12	6	96.4	43.1	80/40	144
1	A	6	6	96.4	40.5	75/37.5	72
1	A	6	6	96.4	40.5	75/37.5	72
0	A	12	6	96.4	14.8	50/25	144

	Sensors Quantity	Total (+ 20% spares)
Outer Axials	1512	1814
Outer Stereo	648	778
L0	144	172
TOTAL	**2304**	**2764**

1.1.2.1	Outer layers	$2,150,566

Notes

We are going to prototype the outer stereo and Axials sensors.
Runs:
1. Prototypes Axials and Small Angle Stereo (30 grade "A"+30 grade "B" each)

WBS	Name	Cost

"Outer layers" continued

Notes
2. Production (Axials, SAS and L0)

Need **1512** Axials and **648** Small Angle Stereo for the project.

1.1.2.1.1 Dummy Sensors: layout $0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
12	Research Associate	25%	20 hrs	0 days	Mon 4/1/02	Fri 4/12/02	$0	$0	$0	$0

Notes
Labor:
This is to prepare masks for dummy sensors (1 metal mask)
Schedule:
work can start once the real prototype sensor layout is finished.

1.1.2.1.2 Dummy Sensors: manufacturing $12,750

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Fri 4/12/02	Fri 4/12/02	$8,500	$0	$0	$8,500
3	FNALCont	0%	0 hrs	0 days	Fri 4/12/02	Fri 4/12/02	$4,250	$0	$0	$4,250

Notes
These are metallised dummy sensors for bonding and mechanical tests.
We are also going to have real mechanicals (just silicon) which is diced at Fermilab.
Cost:
based on quotation from different companies (C.Haber 1/25/2002):
1. 6" Silicon 50 wafers @ 30.00 each = $1,500
2. 1 mask (metal) @ 2,500
3. processing is about $65.00/wafer = $3,250
4. dicing is about $20.00/wafer = $1,000
50 wafers should yield 50 detectors axials and 50 detectors stereo.

1.1.2.1.3 Prototype Sensor Layout $22,369

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	320 hrs	0 days	Mon 2/4/02	Fri 3/29/02	$12,205	$0	$0	$12,205
8	Mech. Engineer-SiDet	75%	240 hrs	0 days	Mon 2/4/02	Fri 3/29/02	$10,164	$0	$0	$10,164
15	Scientist	20%	64 hrs	0 days	Mon 2/4/02	Fri 3/29/02	$0	$0	$0	$0

Notes
Labor:
most of the work is in the general mechanical layout of the sensors. Also lots of detailing is needed

WBS	Name	Cost
1.1.2.1.4	Prototype Sensors: submission	$0
1.1.2.1.5	Prototype Sensor manufacturing	$178,420

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	FNALCont	0%	0 hrs	0 days	Fri 3/29/02	Fri 3/29/02	$16,220	$0	$0	$16,220
5	JapanEQ	0%	0 hrs	0 days	Fri 3/29/02	Fri 3/29/02	$162,200	$0	$0	$162,200

Notes

Cost:

Based on quotation n. 03062002 from Hamamatsu (March 6 2002)

Prototype Sensors

Sensors	Type	Quantity	Unit Price	Total Price
Outer Axial	Grade "A"	30	$792.00	$23,760.00
	Grade "B"	30	$475.00	$14,250.00
	Material, NRE	1	$43,000.00	$43,000.00
Outer Stereo	Grade "A"	30	$792.00	$23,760.00
	Grade "B"	30	$475.00	$14,250.00
	Material, NRE	1	$43,000.00	$43,000.00
	TOTAL			**$162,200.00**

Outer

WBS	Name	Cost
1.1.2.1.6	Prototype Sensors Available	$0
1.1.2.1.7	Sensor final design work	$3,388

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	50%	80 hrs	0 days	Wed 7/17/02	Tue 8/13/02	$3,388	$0	$0	$3,388
15	Scientist	25%	40 hrs	0 days	Wed 7/17/02	Tue 8/13/02	$0	$0	$0	$0

Notes

We are assuming that nothing should change in the design of the sensors. This re-work is scheduled only for very minor modifications if needed.

WBS	Name	Cost
1.1.2.1.8	Prototype Sensor tests	$8,880

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Tue 7/16/02	Tue 7/16/02	$4,000	$0	$0	$4,000
3	FNALCont	0%	0 hrs	0 days	Tue 7/16/02	Tue 7/16/02	$2,000	$0	$0	$2,000
9	Elect. Technician	25%	120 hrs	0 days	Wed 7/17/02	Wed 10/9/02	$2,880	$0	$0	$2,880
12	Research Associate	50%	240 hrs	0 days	Wed 7/17/02	Wed 10/9/02	$0	$0	$0	$0
15	Scientist	25%	120 hrs	0 days	Wed 7/17/02	Wed 10/9/02	$0	$0	$0	$0

WBS	Name	Cost

"Prototype Sensor tests" continued

Notes

Cost:
This is to setup some radiation damage test (special boards), and tests at the probe station.
All needed equipment already in hand for a small task such as this (we estimate of the order of 20 detectors to be tested at this stage at FNAL)
Estimated from IIa
$100 each rad-test board (10 boards)
$500 box of needles for the probe station
$1,500 PC with labview controlling the probestation equipment.
$1,000 miscellanea cables and connectors.
Total $4,000
Labor:
This is done mostly in Japan (Tsukuba and Okayama).
Here we'll just verify some of the measurements and perform radiation damage tests.

1.1.2.1.9   Silicon Production Sensor ready to order $0

Notes

Schedule:
We can order production silicon (also L0) after test of the prototype.

1.1.2.1.10   Production Sensors manufacturing $0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	JapanEQ	0%	0 hrs	0 days	Wed 10/9/02	Wed 10/9/02	$0	$0	$0	$0

Notes

Schedule:
Hamamatsu promised 200 detectors/month after a lag time of 4 months from
receipt of order. 2,592 detectors/200/month = 13 + 4 month = 340 days
We need to add 1 month for the L0 production (see "L0 sensor production")
Total months 18 = 360 days

1.1.2.1.11   Axial sensor order (1st half) $662,634

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 10/9/02	Wed 10/9/02	$75,033	$0	$0	$75,033
3	FNALCont	0%	0 hrs	0 days	Wed 10/9/02	Wed 10/9/02	$135,600	$0	$0	$135,600
5	JapanEQ	0%	0 hrs	0 days	Wed 10/9/02	Wed 10/9/02	$452,002	$0	$0	$452,002

Notes

Cost:
Based on quotation n. 03062002 from Hamamatsu (March 6 2002)
1512 needed +20% spares = 1814 * $460 + $57,143 (masks + NRE +Silicon).
Total = **904,003 USD**.
150,065 USD added for indirect costs (16.6%)

WBS	Name	Cost

"Axial sensor order (1st half)" continued

Notes

Contingency is 30%
split order in half to reflect Japanese funding profile:
452,001.5 + 75,032.5 indirect

1.1.2.1.12   Axial sensor order (2nd half) $635,635

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Mon 10/27/03	Mon 10/27/03	$75,033	$0	$0	$75,033
3	FNALCont	0%	0 hrs	0 days	Mon 10/27/03	Mon 10/27/03	$135,600	$0	$0	$135,600
5	JapanEQ	0%	0 hrs	0 days	Mon 10/27/03	Mon 10/27/03	$425,002	$0	$0	$425,002

Notes

order split to better match Japanese funding profile

1.1.2.1.13   Small Angle Stereo order (1st half) $626,490

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 10/9/02	Wed 10/9/02	$70,940	$0	$0	$70,940
3	FNALCont	0%	0 hrs	0 days	Wed 10/9/02	Wed 10/9/02	$128,204	$0	$0	$128,204
5	JapanEQ	0%	0 hrs	0 days	Wed 10/9/02	Wed 10/9/02	$427,346	$0	$0	$427,346

Notes

Cost:
Based on quotation n. 03062002 from Hamamatsu (March 6 2002)
648 needed +20% spares = 778 * $484 + $50,794 (masks + NRE +Silicon).
Total = **427,346 USD**.
70,940 USD added for indirect costs (16.6%)
Contingency is 30%

1.1.2.1.14   Small Angle Stereo order (2nd half) $0

Notes

order split to better match Japanese funding profile

1.1.2.1.15   Sensor Testing $0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	NonFnal Labor	100%	2,880 hrs	0 days	Thu 2/13/03	Fri 7/23/04	$0	$0	$0	$0

Notes

Testing includes Outer Axials, Outer SAS and L0
Schedule:
Testing will be done by the vendor (included in the sensors price).

WBS	Name	Cost

"Sensor Testing" continued

Notes
We will receive 200 sensors/month.
we will probe a sample (<~10%) of the sensor production once the prototype gave us confidence
on the quality and reliability of the vendor measurements.
Cost:
All equipment costs handled by Japan (Tsukuba and Okayama).
Labor:
Provided by Japan
Estimated to be 1.0 FTE

WBS	Name	Cost
1.1.2.1.16	Production Sensors Available	$0
1.1.2.1.17	Production Sensors Complete	$0
1.1.2.2	layer L0	$145,680

Notes
Given the small number of detectors needed and the use of the same technology as for the Outer sensors we order directly the production.
Need **144** for the project.

1.1.2.2.1 — L0 Sensor final design work — $22,369

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	320 hrs	0 days	Tue 5/28/02	Tue 7/23/02
8	Mech. Engineer-SiDet	75%	240 hrs	0 days	Tue 5/28/02	Tue 7/23/02
15	Scientist	20%	64 hrs	0 days	Tue 5/28/02	Tue 7/23/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$12,205	$0	$0	$12,205
8	Mech. Engineer-SiDet	75%	$10,164	$0	$0	$10,164
15	Scientist	20%	$0	$0	$0	$0

Notes
This work is linked with the mechanical understanding of the L0 structure.
Labor:
most of the work is in the general mechanical layout of the sensors. Also lots of detailing is needed

WBS	Name	Cost
1.1.2.2.2	L0 Production sensor order	$0
1.1.2.2.3	L0 Sensor Production	$123,311

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 5/7/03	Wed 5/7/03	$13,963	$0	$0	$13,963
3	FNALCont	0%	0 hrs	0 days	Wed 5/7/03	Wed 5/7/03	$25,234	$0	$0	$25,234

WBS	Name	Cost

"L0 Sensor Production" continued

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	JapanEQ	0%	0 hrs	0 days	Wed 5/7/03	Wed 5/7/03	$84,114	$0	$0	$84,114

Notes

Schedule:
172 detectors needed. This is ~1 month worth of production.
We assume here this "dedicated" month to be May 2003.
Cost:
Based on quotation n. 03062002 from Hamamatsu (March 6 2002)
144 sensors needed + 20% spares = 172*$222 (35 KYen) + $45,930 (Masks, NRE, Silicon)
Total **84,114 USD**.
13,963 USD added for indirect costs (16.6%)
Contingency is 30%

1.1.2.2.4		Sensor Testing	$0

Notes

Labor:
Already considered in the outer sensors.

1.1.2.2.5		L0 Sensors Available	$0
1.1.2.2.6		L0 Sensors Complete	$0
1.1.3		Construction of Modules, Staves and L0	$2,217,229

Notes

Need 180 staves, 1080 modules for the outer
72 modules for L0

1.1.3.1		Beginning of Mechanical Project	$0

Notes

This task marks the end of the conceptual work and the beginning of the specific realization of mechanical parts.

1.1.3.2		L0 Construction	$518,187

Notes

Required quantity for the L0 detector is 72 modules. We should schedule and cost 100 production modules based on the L00 experience

1.1.3.2.1		L0 analogue signal cables	$329,330

Notes

These are Kapton cables which carry the analogue signals from the silicon to the input of the SVX4 chips.
We assume we will have 2 long (580mm), 2 medium (400mm) and 2 short (220mm) cables per sector (12*2 sectors in total).
Runs:

WBS	Name	Cost

"L0 analogue signal cables" continued

Notes
1. many small test run just to adjust the process
2. preproduction
3. production

Total cables needed = **144**

1.1.3.2.1.1 — L0 cables technology testing — $41,616

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 9/3/01	Mon 9/3/01	$3,300	$0	$0	$3,300
3	FNALCont	0%	0 hrs	0 days	Mon 9/3/01	Mon 9/3/01	$10,000	$0	$0	$10,000
5	JapanEQ	0%	0 hrs	0 days	Mon 9/3/01	Mon 9/3/01	$20,000	$0	$0	$20,000
7	Elect. Engineer	5%	80 hrs	0 days	Mon 9/3/01	Fri 6/21/02	$4,076	$0	$0	$4,076
9	Elect. Technician	5%	80 hrs	0 days	Mon 9/3/01	Fri 6/21/02	$1,920	$0	$0	$1,920
12	Research Associate	10%	160 hrs	0 days	Mon 9/3/01	Fri 6/21/02	$0	$0	$0	$0
14	Wirebonder-SiDet	5%	80 hrs	0 days	Mon 9/3/01	Fri 6/21/02	$2,320	$0	$0	$2,320
16	NonFnal Labor	25%	400 hrs	0 days	Mon 9/3/01	Fri 6/21/02	$0	$0	$0	$0

Notes
These are multiple runs with very few cables (L00 style) each just to test the quality of the process.
This effor will determine the technology and vendor we will use for final fabrication.
Labor:
work done in Japan.
Estimated in 0.25 FTE (mostly keep contacts with the vendor and FNAL and some testing)
no FNAL labor except for minimum testing (wirebonding tests, electrical tests).

1.1.3.2.1.2 — L0 Test cables Available — $0

Notes
These are the L00 design cables. They can be used for electrical test.

1.1.3.2.1.3 — L0 cable preproduction design — $11,947

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	75%	180 hrs	0 days	Mon 4/29/02	Mon 6/10/02	$6,865	$0	$0	$6,865
8	Mech. Engineer-SiDet	50%	120 hrs	0 days	Mon 4/29/02	Mon 6/10/02	$5,082	$0	$0	$5,082
12	Research Associate	25%	60 hrs	0 days	Mon 4/29/02	Mon 6/10/02	$0	$0	$0	$0

Notes
This design goes in parallel with the CF support structure design.
The preproduction design should be also the final design for L0 cables.
Labor:
the design will be done at FNAL.

WBS		Name				Cost			
1.1.3.2.1.4		L0 preproduction fabrication				$49,300			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Mon 6/10/02	Mon 6/10/02	$19,700	$0	$0	$19,700
5	JapanEQ	0%	0 hrs	0 days	Mon 6/10/02	Mon 6/10/02	$29,600	$0	$0	$29,600

Notes

Cost:
Based on quote from KeyCom, Japan
Preproduction quantity is 10 cables for each length.
Type A: 1.080 MYen = 8.1K$
Type B: 1.314 MYen = 9.9K$
Type C: 1.536 MYen = 11.6K$
Total = 29.6K$
Added 50% contingency
Added 16.6% for indirect costs.

1.1.3.2.1.5	L0 Preproduction cable available	$0

1.1.3.2.1.6	L0 Preproduction evaluation	$4,014

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	40 hrs	0 days	Thu 10/17/02	Wed 11/13/02
11	Mech. Technician-SiDet	50%	80 hrs	0 days	Thu 10/17/02	Wed 11/13/02
12	Research Associate	100%	160 hrs	0 days	Thu 10/17/02	Wed 11/13/02
16	NonFnal Labor	100%	160 hrs	0 days	Thu 10/17/02	Wed 11/13/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	50%	$2,320	$0	$0	$2,320
12	Research Associate	100%	$0	$0	$0	$0
16	NonFnal Labor	100%	$0	$0	$0	$0

Notes

Labor:
FNAL labor is for testing cables (electrical, mechanical and wirebonding) and establish
procedures for cutting and handling them.
Some electrical testing will be done in Japan.
Estimated to be 1 FTE

1.1.3.2.1.7	L0 production cable design	$33,553

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	480 hrs	0 days	Thu 11/14/02	Wed 2/19/03
8	Mech. Engineer-SiDet	75%	360 hrs	0 days	Thu 11/14/02	Wed 2/19/03

WBS	Name	Cost

"L0 production cable design" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
12	Research Associate	25%	120 hrs	0 days	Thu 11/14/02	Wed 2/19/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$18,307	$0	$0	$18,307
8	Mech. Engineer-SiDet	75%	$15,246	$0	$0	$15,246
12	Research Associate	25%	$0	$0	$0	$0

Notes

Labor:
we assume some minor modifications needed to the mecahnics of the cable design.
This is all FNAL labor

1.1.3.2.1.8   L0 cable production $188,900

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 2/19/03	Wed 2/19/03	$18,900	$0	$0	$18,900
3	FNALCont	0%	0 hrs	0 days	Wed 2/19/03	Wed 2/19/03	$56,000	$0	$0	$56,000
5	JapanEQ	0%	0 hrs	0 days	Wed 2/19/03	Wed 2/19/03	$114,000	$0	$0	$114,000

Notes

6 types of cables, 3 lengths, 48 of each length for the whole detector
Cost:
Based on quote from KeyCom, Japan.
type A: 456k NRE + 62.4k yen/cable = 4.2Myen=$31,668 [220mm long, 48 needed, 60 ordered]
type B: 588k NRE + 72.6kyen/cable = 4.9Myen =$36,946 [400mm long, 48 needed, 60 ordered]
typeC: 636k NRE + 90.0kyen/cable = 6.04Myen=$45,542 [580mm long, 48 needed, 60 ordered]
exchange rate considered is 0.00754 USD/Yen
Total is = 114,156 $

$18.9K added for indirect costs (16.6%)

1.1.3.2.1.9   L0 Cable Production Test $0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	NonFnal Labor	150%	1,200 hrs	0 days	Thu 3/20/03	Fri 8/8/03	$0	$0	$0	$0

Notes

Labor:
Non FNAL labor. Tests will be performed in Japan.
Some tests are part of the production of the cables and have been priced together with the cable.
Estimated labor in Japan 1.5 FTE

1.1.3.2.1.10   L0 cables Available $0

WBS	Name	Cost
1.1.3.2.1.11	L0 cables Complete	$0
1.1.3.2.2	layer 0 modules	$188,856

Notes

Modules are formed by 2 sensors glued "head-on", a pair of Kapton cables (analogue cable) and one 2-chips L0 hybrid.
Need **72** for the project.

1.1.3.2.2.1   L0 modules R&D and Prototype $25,757

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	50%	320 hrs	0 days	Thu 7/25/02	Thu 11/14/02
8	Mech. Engineer-SiDet	50%	320 hrs	0 days	Thu 7/25/02	Thu 11/14/02
12	Research Associate	50%	320 hrs	0 days	Thu 7/25/02	Thu 11/14/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	50%	$12,205	$0	$0	$12,205
8	Mech. Engineer-SiDet	50%	$13,552	$0	$0	$13,552
12	Research Associate	50%	$0	$0	$0	$0

Notes

General:
This work is to establish whether the L0 electrical concept is sound.
We will use some hybrid (outer), cables (test cables) and sensors (old L00 sensors).

1.1.3.2.2.2   L0 module: fixtures design $16,777

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	240 hrs	0 days	Wed 7/24/02	Wed 9/4/02	$9,154	$0	$0	$9,154
8	Mech. Engineer-SiDet	75%	180 hrs	0 days	Wed 7/24/02	Wed 9/4/02	$7,623	$0	$0	$7,623

Notes

Labor:
Needed to modify the old L00 fixtures

1.1.3.2.2.3   L0 module: material and fixtures $30,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 9/4/02	Wed 9/4/02	$20,000	$0	$0	$20,000
3	FNALCont	0%	0 hrs	0 days	Wed 9/4/02	Wed 9/4/02	$10,000	$0	$0	$10,000

Notes

Schedule:
we need to have fixtures ready when sensors, hybrids and signal cables for L0 are ready
Cost:
based on Engineering Estimate

WBS	Name	Cost

"L0 module: material and fixtures" continued

Notes
1. 2 fixtures for sensor to sensor and cable gluing at 7.5K/fixture =15k
2. 5k for misc. stuff. (material and other small fixtures)

1.1.3.2.2.4   L0 preproduction module construction $9,118

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	40 hrs	0 days	Mon 7/7/03	Fri 8/1/03	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	150%	240 hrs	0 days	Mon 7/7/03	Fri 8/1/03	$6,960	$0	$0	$6,960
12	Research Associate	50%	80 hrs	0 days	Mon 7/7/03	Fri 8/1/03	$0	$0	$0	$0
13	CMM Programmer-SiDet	10%	16 hrs	0 days	Mon 7/7/03	Fri 8/1/03	$464	$0	$0	$464

Notes
Schedule:
This is done with Preproduction L0 hybrids, Preproduction cables and Production detectors.
Represents the FIRST milestone for the L0 project.
We will make 6 modules to test the final concept.
Labor:
1. mech. tech. (150%) gluing sensors and cables
2. CMM prog. (10%) for setting up program at the CMM to identify sensor fiducials
3. mech engineer (25%) support
4. Research Associate (50%) support

1.1.3.2.2.5   L0 Preproduction modules available $0

1.1.3.2.2.6   L0 preproduction modules evaluation $2,880

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	25%	120 hrs	0 days	Mon 8/4/03	Mon 10/27/03	$2,880	$0	$0	$2,880
12	Research Associate	150%	720 hrs	0 days	Mon 8/4/03	Mon 10/27/03	$0	$0	$0	$0
15	Scientist	25%	120 hrs	0 days	Mon 8/4/03	Mon 10/27/03	$0	$0	$0	$0

Notes
This is the important test for L0, establishing that everything is working properly and that we can proceed to the production phase.
Labor:
1. Research associate (150%) electrical test
2. Elect. Technician (25%) support
3. Scientist (25%) support

1.1.3.2.2.7   Milestone#2: L0 preproduction module ready $0

WBS	Name	Cost
1.1.3.2.2.8	Production L0 module: fixture design	$17,029

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	75%	180 hrs	0 days	Tue 10/28/03	Wed 12/10/03
8	Mech. Engineer-SiDet	100%	240 hrs	0 days	Tue 10/28/03	Wed 12/10/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	75%	$6,865	$0	$0	$6,865
8	Mech. Engineer-SiDet	100%	$10,164	$0	$0	$10,164

Notes

This is to possibly modify the preproduction fixtures.
This is a contingency task.

1.1.3.2.2.9	Production L0 module: material and fixtures	$72,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 12/10/03	Wed 12/10/03	$48,000	$0	$0	$48,000
3	FNALCont	0%	0 hrs	0 days	Wed 12/10/03	Wed 12/10/03	$24,000	$0	$0	$24,000

Notes

Cost:
 We need 2 sets of fixtures + 1 spare.
Based on Engineering Estimate.
A set of fixture include detector to detector gluing, cable to detector gluing, cable to cable alignment, cable to hybrid gluing, cable cutting.
Cost of each set is ~16K.
Total cost is 48K$

1.1.3.2.2.10	L0 Module production	$15,296

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	90 hrs	0 days	Thu 2/19/04	Wed 4/21/04
11	Mech. Technician-SiDet	100%	360 hrs	0 days	Thu 2/19/04	Wed 4/21/04
12	Research Associate	50%	180 hrs	0 days	Thu 2/19/04	Wed 4/21/04
13	CMM Programmer-SiDet	10%	36 hrs	0 days	Thu 2/19/04	Wed 4/21/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$3,812	$0	$0	$3,812
11	Mech. Technician-SiDet	100%	$10,440	$0	$0	$10,440
12	Research Associate	50%	$0	$0	$0	$0
13	CMM Programmer-SiDet	10%	$1,044	$0	$0	$1,044

WBS	Name	Cost

"L0 Module production" continued

Notes

Schedule:
We assume a rate of 2 L0 modules a day => ~45 days (need 72 modules, we'll build ~90)
Labor:
one full time technician needed.
All other personnel are for support.

WBS	Name	Cost
1.1.3.2.2.11	L0 Production Modules Available	$0
1.1.3.2.2.12	L0 Production Modules Complete	$0

Notes

72 modules for the whole detector. Assume we can make 4/day = 25 days for 100 modules

WBS	Name	Cost
1.1.3.3	Outer layer modules	$530,439

Notes

It consists of 2 sensors glued together "head-on". On top of one sensor one hybrid and one pitch adapter is also glued. Module is wirebonded and put on a G-10 frame for testing.
Need **882** modules for the project.

WBS	Name	Cost
1.1.3.3.1	Prototype Module: fixtures design	$44,330

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	75%	360 hrs	0 days	Wed 1/30/02	Tue 4/23/02
7	Elect. Engineer	25%	120 hrs	0 days	Wed 1/30/02	Tue 4/23/02
8	Mech. Engineer-SiDet	75%	360 hrs	0 days	Wed 1/30/02	Tue 4/23/02
9	Elect. Technician	50%	240 hrs	0 days	Wed 1/30/02	Tue 4/23/02
11	Mech. Technician-SiDet	25%	120 hrs	0 days	Wed 1/30/02	Tue 4/23/02
12	Research Associate	50%	240 hrs	0 days	Wed 1/30/02	Tue 4/23/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	75%	$13,730	$0	$0	$13,730
7	Elect. Engineer	25%	$6,114	$0	$0	$6,114
8	Mech. Engineer-SiDet	75%	$15,246	$0	$0	$15,246
9	Elect. Technician	50%	$5,760	$0	$0	$5,760
11	Mech. Technician-SiDet	25%	$3,480	$0	$0	$3,480
12	Research Associate	50%	$0	$0	$0	$0

Notes

Labor:
This is for fixture designing and also to get all other support material in place for prototype module construction (support are: boxes, storage, designing G-10 frames for holding/testing modules, programming the CMM machines etc.)

WBS	Name	Cost
1.1.3.3.2	Prototype Module: material and fixtures	$33,750

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Tue 4/23/02	Tue 4/23/02	$22,500	$0	$0	$22,500
3	FNALCont	0%	0 hrs	0 days	Tue 4/23/02	Tue 4/23/02	$11,250	$0	$0	$11,250

Notes

Schedule:
These are the fixtures for prototype module construction in summer 2002.
Cost:
1. detector/detector alignment fixtures (5K each)
2. hybrid/pitch adapter gluing fixture (3k each)
3. wirebonding fixture (2k each)
4. testing mechanical setup (2k each) [*2]
5. G-10 frames (0.025k each) [*180]
6. miscellanea material 4k

WBS	Name	Cost
1.1.3.3.3	Prototype Module: Assembling	$37,975

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	20%	96 hrs	0 days	Thu 7/25/02	Thu 10/17/02
8	Mech. Engineer-SiDet	25%	120 hrs	0 days	Thu 7/25/02	Thu 10/17/02
11	Mech. Technician-SiDet	150%	720 hrs	0 days	Thu 7/25/02	Thu 10/17/02
12	Research Associate	75%	360 hrs	0 days	Thu 7/25/02	Thu 10/17/02
13	CMM Programmer-SiDet	10%	48 hrs	0 days	Thu 7/25/02	Thu 10/17/02
14	Wirebonder-SiDet	50%	240 hrs	0 days	Thu 7/25/02	Thu 10/17/02
15	Scientist	25%	120 hrs	0 days	Thu 7/25/02	Thu 10/17/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	20%	$3,661	$0	$0	$3,661
8	Mech. Engineer-SiDet	25%	$5,082	$0	$0	$5,082
11	Mech. Technician-SiDet	150%	$20,880	$0	$0	$20,880
12	Research Associate	75%	$0	$0	$0	$0
13	CMM Programmer-SiDet	10%	$1,392	$0	$0	$1,392
14	Wirebonder-SiDet	50%	$6,960	$0	$0	$6,960
15	Scientist	25%	$0	$0	$0	$0

Notes

Schedule:
30 modules to be built. We assume 0.5 modules/day for the prototypes.
Labor:
1. postdoc (75%) support
2. mech. technician (100%) gluing/aligning
3. wirebonder (50%)

WBS	Name	Cost

"Prototype Module: Assembling " continued

Notes

4. mech. technician (50%) for miscellanea (boxes, storage etc.)
5. mech. engineer (25%) support
6. draftsman (20%) for miscellanea boxes, storage, modifications to fixtures etc.
7. scientist (25%) support

WBS	Name	Cost
1.1.3.3.4	Prototype modules available	$0
1.1.3.3.5	Contingency Module: Assembling	$0

Notes

Schedule:
30 modules to be build and tested (5 staves). We assume 0.5 modules/day for the prototypes.
Labor:
No labor since if we are here means that we did not use the prototype assembling labor.
Just a shift in the schedule.

WBS	Name	Cost
1.1.3.3.6	Contingency modules available	$0
1.1.3.3.7	Preproduction Module: fixtures design	$22,165

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	75%	180 hrs	0 days	Fri 3/7/03	Thu 4/17/03	$6,865	$0	$0	$6,865
7	Elect. Engineer	25%	60 hrs	0 days	Fri 3/7/03	Thu 4/17/03	$3,057	$0	$0	$3,057
8	Mech. Engineer-SiDet	75%	180 hrs	0 days	Fri 3/7/03	Thu 4/17/03	$7,623	$0	$0	$7,623
9	Elect. Technician	50%	120 hrs	0 days	Fri 3/7/03	Thu 4/17/03	$2,880	$0	$0	$2,880
11	Mech. Technician-SiDet	25%	60 hrs	0 days	Fri 3/7/03	Thu 4/17/03	$1,740	$0	$0	$1,740
12	Research Associate	50%	120 hrs	0 days	Fri 3/7/03	Thu 4/17/03	$0	$0	$0	$0

Notes

This is for fixture re-designing and also to get all other support inplace for productionmodule construction (support are: boxes, storage, designing G-10 frames for holding/testing modules, programming the CMM machines etc.)
Labor:
1. Mech engineer (75%) fixtures and supervision
2. Draftsman (75%) support for mech. engineer
3. postdoc (50%) support
4. mech. technician (25%) support
5. Elect. Engineer (25%) designing test boards
6. Elect. technician (25%) support

WBS	Name	Cost
1.1.3.3.8	Preproduction Module: material and fixtures	$57,750

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$38,500	$0	$0	$38,500
3	FNALCont	0%	0 hrs	0 days	Thu 4/17/03	Thu 4/17/03	$19,250	$0	$0	$19,250

WBS	Name	Cost

"Preproduction Module: material and fixtures" continued

Notes

Schedule:

These are the fixtures for production of the module construction.

We assume that we can align 6 silicon pairs on a single fixture/day and 1 hybrid/pitch-adapter per day. In preproduction we assume we manufacture the FINAL production fixtures just in a smaller quantity than needed to sustain the final production rate.

Cost:

We assume to have to remake all fixtures used for the prototype phase.

1. fixtures for detector-detector (5k each) [*2]
2. fixture for hybrid/pitch to detector (3k each) [*4]
3. fixture for wirebonding modules (2k each) [*2]
4. testing mechanical setup (2k each) [*2]
5. G-10 frames (0.025k each) [*180]
6. miscellanea materials, boxes, storage cabinets (4K total)

	1.1.3.3.9	Preproduction module: Assembling				$80,390

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	200 hrs	0 days	Tue 8/19/03	Thu 1/22/04
11	Mech. Technician-SiDet	200%	1,600 hrs	0 days	Tue 8/19/03	Thu 1/22/04
12	Research Associate	75%	600 hrs	0 days	Tue 8/19/03	Thu 1/22/04
13	CMM Programmer-SiDet	10%	80 hrs	0 days	Tue 8/19/03	Thu 1/22/04
14	Wirebonder-SiDet	100%	800 hrs	0 days	Tue 8/19/03	Thu 1/22/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$8,470	$0	$0	$8,470
11	Mech. Technician-SiDet	200%	$46,400	$0	$0	$46,400
12	Research Associate	75%	$0	$0	$0	$0
13	CMM Programmer-SiDet	10%	$2,320	$0	$0	$2,320
14	Wirebonder-SiDet	100%	$23,200	$0	$0	$23,200

Notes

We need to provide enough modules to sustain the ramp up stave

production from June to October 2003 = 24 staves = 144 modules.

Rate is ~1.5 modules/day

Labor:

1. mech. technician (100%)
2. mech. technician (100%) a second equivalent mech tech. is accounted here to be taught the job.
3. wirebonder (100%)
4. postdoc (75%) support
5. mech engineer (25%) support
6. CMM programmer (10%)

1.1.3.3.10	Preproduction modules available	$0

WBS	Name					Cost			
1.1.3.3.11	Production Module: contingency fixtures design					$14,777			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	75%	120 hrs	0 days	Wed 9/3/03	Tue 9/30/03	$4,577	$0	$0	$4,577
7	Elect. Engineer	25%	40 hrs	0 days	Wed 9/3/03	Tue 9/30/03	$2,038	$0	$0	$2,038
8	Mech. Engineer-SiDet	75%	120 hrs	0 days	Wed 9/3/03	Tue 9/30/03	$5,082	$0	$0	$5,082
9	Elect. Technician	50%	80 hrs	0 days	Wed 9/3/03	Tue 9/30/03	$1,920	$0	$0	$1,920
11	Mech. Technician-SiDet	25%	40 hrs	0 days	Wed 9/3/03	Tue 9/30/03	$1,160	$0	$0	$1,160
12	Research Associate	50%	80 hrs	0 days	Wed 9/3/03	Tue 9/30/03	$0	$0	$0	$0

Notes

This is for fixture re-designing and also to get all other support in place for production module construction (support are: boxes, storage, designing G-10 frames for holding/testing modules, programming the CMM machines etc.)
Labor:
1. Mech engineer (25%)
2. Draftsman (50%)
3. mech. technician (25%)
4. Elect. Engineer (10%)
5. Elect. Technician (25%)
6. postdoc (50%)

WBS	Name					Cost			
1.1.3.3.12	Production modules: material and fixtures					$70,125			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 9/30/03	Tue 9/30/03	$46,750	$0	$0	$46,750
3	FNALCont	0%	0 hrs	0 days	Tue 9/30/03	Tue 9/30/03	$23,375	$0	$0	$23,375

Notes

Cost:
We assume a similar final design for the fixture and small modifications of the pre-production fixtures in quantity suitable for the production rate.
We assume that we can align up to 6 silicon pairs on a single fixture/day and 1 hybrid/pitch-adapter per day on a single fixture.
1. fixtures for detector-detector (5k each) [*0] we don't need extra for production
2. fixture for hybrid/pitch to detector (3k each) [*6]
3. fixture for wirebonding modules (2k each) [*2]
4. testing mechanical setup (2k each) [*0] we don't need extra for production
5. G-10 frames (0.025k each) [*750]
6. miscellanea materials, boxes, storage cabinets (6K total)

WBS	Name				Cost	
1.1.3.3.13	Production Modules: Assembling				$169,176	

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	10%	160 hrs	0 days	Tue 1/27/04	Thu 11/4/04
11	Mech. Technician-SiDet	250%	4,000 hrs	0 days	Tue 1/27/04	Thu 11/4/04
12	Research Associate	75%	1,200 hrs	0 days	Tue 1/27/04	Thu 11/4/04

WBS	Name	Cost

"Production Modules: Assembling" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
14	Wirebonder-SiDet	100%	1,600 hrs	0 days	Tue 1/27/04	Thu 11/4/04
15	Scientist	25%	400 hrs	0 days	Tue 1/27/04	Thu 11/4/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	10%	$6,776	$0	$0	$6,776
11	Mech. Technician-SiDet	250%	$116,000	$0	$0	$116,000
12	Research Associate	75%	$0	$0	$0	$0
14	Wirebonder-SiDet	100%	$46,400	$0	$0	$46,400
15	Scientist	25%	$0	$0	$0	$0

Notes

Schedule:
we need to sustain >~1 stave/day >~ 6 modules/day.
For 200 staves we need 1200 modules = 200 days.
Labor:
1. mech technician (200%)
2. wirebonder (100%)
3. Scientist (25%) support
4. mech engineer (10%) support
5. technician specialist (25%) support
6. mech technician (50%) mechanical support
7. postdoc (75%) support

1.1.3.3.14	Production modules available	$0

1.1.3.3.15	Module Production complete	$0

1.1.3.4	Outer layer Staves	$1,168,604

1.1.3.4.1	Prototype stave :Structural and cooling R&D	$100,074

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$20,000	$0	$0	$20,000
3	FNALCont	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$10,000	$0	$0	$10,000
6	Designer-SiDet	100%	640 hrs	0 days	Mon 1/7/02	Fri 4/26/02	$24,410	$0	$0	$24,410
8	Mech. Engineer-SiDet	100%	640 hrs	0 days	Mon 1/7/02	Fri 4/26/02	$27,104	$0	$0	$27,104
11	Mech. Technician-SiDet	100%	640 hrs	0 days	Mon 1/7/02	Fri 4/26/02	$18,560	$0	$0	$18,560
12	Research Associate	50%	320 hrs	0 days	Mon 1/7/02	Fri 4/26/02	$0	$0	$0	$0
15	Scientist	25%	160 hrs	0 days	Mon 1/7/02	Fri 4/26/02	$0	$0	$0	$0

Notes

Cost:

WBS	Name	Cost

"Prototype stave :Structural and cooling R&D" continued

Notes

we estimated here the cost for parts and fixtures to test various concepts and materials and to sustain a minimum R&D effort on these important issues.
Labor:
includes all labor needed to come up with the final design of the stave and fixtures to build staves.

1.1.3.4.2	Prototype Stave Design complete	$0

Notes

Both the stave and fixtures.

1.1.3.4.3	Prototype Stave: material and fixtures	$99,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Fri 4/26/02	Fri 4/26/02	$66,000	$0	$0	$66,000
3	FNALCont	0%	0 hrs	0 days	Fri 4/26/02	Fri 4/26/02	$33,000	$0	$0	$33,000

Notes

Schedule:
This is the time needed at the machine shop to prepare all fixtures. It also includes the time needed for assembling, inspecting atc. the fixtures. Some fixture will require more time but we assume here that we get at least 1 fixture for flavour in order to start the assembling process.
Cost:
1. mecahnical stave related material and intermediate fixtures (7k total)
2. mechanical stave core assembly fixture (5k total)
3. laminating the bus cable fixture (5k)
5. One set of axial and stereo module alignment fixtures (10k each=20k)
6. stave wirebonding fixture (3k each) [*2]
7. stave inspection fixture (3k each)
8. stave storage boxes (0.5 each) [*20]
9. miscellanea material, testing boxes, storage cabinets etc. (10k total)

1.1.3.4.4	Prototype Stave: mechanical construction	$21,948

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	80 hrs	0 days	Tue 6/11/02	Tue 8/6/02	$3,388	$0	$0	$3,388
11	Mech. Technician-SiDet	200%	640 hrs	0 days	Tue 6/11/02	Tue 8/6/02	$18,560	$0	$0	$18,560
12	Research Associate	50%	160 hrs	0 days	Tue 6/11/02	Tue 8/6/02	$0	$0	$0	$0

Notes

This is to prepare a few (~ 30) mechanical staves with the prototype design
as part of the electrical stave prototypes milestone.
Schedule:
The start date is driven by the availability of the prototype bus cable. The end date is drivern
by being ready for stave prototype construction when all the other parts are ready.
Labor:
1. Mech Tech Specialist (100%) laminating CF sheets, gluing the stave on the mold

WBS	Name	Cost

"Prototype Stave: mechanical construction" continued

Notes

2. Mech Technician (100%) Preparing parts.
3. Mech Engineer (25%) Support
4. Research Associate (50%) Support

1.1.3.4.5	Prototype Stave: mechanicals available	$0

Notes

This is mechanical staves

1.1.3.4.6	Prototype Stave: mechanical testing	$25,336

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	160 hrs	0 days	Wed 7/10/02	Wed 10/30/02
11	Mech. Technician-SiDet	100%	640 hrs	0 days	Wed 7/10/02	Wed 10/30/02
12	Research Associate	25%	160 hrs	0 days	Wed 7/10/02	Wed 10/30/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$6,776		$0	$0	$6,776
11	Mech. Technician-SiDet	100%	$18,560		$0	$0	$18,560
12	Research Associate	25%	$0		$0	$0	$0

Notes

This is all those tests aimed at making sure that the design and assembling procedures are within our mechanical specs.

1.1.3.4.7	Prototype Stave: electrical assembly	$29,976

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	50%	160 hrs	0 days	Thu 8/8/02	Thu 10/3/02
11	Mech. Technician-SiDet	150%	480 hrs	0 days	Thu 8/8/02	Thu 10/3/02
12	Research Associate	50%	160 hrs	0 days	Thu 8/8/02	Thu 10/3/02
13	CMM Programmer-SiDet	50%	160 hrs	0 days	Thu 8/8/02	Thu 10/3/02
14	Wirebonder-SiDet	50%	160 hrs	0 days	Thu 8/8/02	Thu 10/3/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	50%	$6,776		$0	$0	$6,776
11	Mech. Technician-SiDet	150%	$13,920		$0	$0	$13,920
12	Research Associate	50%	$0		$0	$0	$0
13	CMM Programmer-SiDet	50%	$4,640		$0	$0	$4,640
14	Wirebonder-SiDet	50%	$4,640		$0	$0	$4,640

WBS	Name	Cost

"Prototype Stave: electrical assembly" continued

Notes
Schedule:
The beginning of this task is driven by having prototype modules available, which is driven by the sensors. We assume it will take 2 weeks to make the 1st prototype electrical stave.
We are buying enough prototype parts to make 5 electrical staves.
and the duration of 40 days is to make 5 staves.
Labor:
1. Mech Technician (100%) gluing/aligning modules on staves
2. Mech Technician (50%) bonding
3. Mech Tech Specialist (50%) overseeing, troubleshooting etc.
4. Research Associate (50%) Support
5. Mech. Engineer (50%) Support
6. CMM programmer (50%)

1.1.3.4.8   **Prototype Stave: electrical testing**   **$10,394**

ID	Resource Name	Units	Work	Delay	Start	Finish
7	Elect. Engineer	25%	130 hrs	0 days	Thu 8/15/02	Thu 11/14/02
10	Elect. Technician-SiDet	25%	130 hrs	0 days	Thu 8/15/02	Thu 11/14/02
12	Research Associate	200%	1,040 hrs	0 days	Thu 8/15/02	Thu 11/14/02
15	Scientist	50%	260 hrs	0 days	Thu 8/15/02	Thu 11/14/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	$6,624		$0	$0	$6,624
10	Elect. Technician-SiDet	25%	$3,770		$0	$0	$3,770
12	Research Associate	200%	$0	$0	$0	$0
15	Scientist	50%	$0	$0	$0	$0

Notes
Labor:
This is ALL the electrical testing crew at FNAL. We don't divide it up between hybrid, modules, staves and burn-in stave parts. All SiDet electrical testing (up to the Stave) is considered here in terms of labor. The prototype effort is estimated based on a total of 4 FTE postdocs + 1 FTE scientist + 0.5 FTE electrical techician (for repair) for the PRODUCTION.

1.1.3.4.9   **MILESTONE#1: Prototype Stave available**   **$0**

Notes
We assume it will take 2 weeks (10d) to put all the parts together to make the first prototype stave.

1.1.3.4.10   **Contingency Stave: electrical assembly**   **$0**

Notes
Labor:
There is no cost and no labor here because this is just a Schedule Contingency.
Cost and labor are already estimated for the milestone #1

WBS	Name	Cost
1.1.3.4.11	Contingency Stave: electrical testing	$0

Notes

Labor:
This is ALL the electrical testing crew at FNAL. We don't divide it up between hybrid, modules, staves and burn-in stave parts. All SiDet electrical testing (up to the Stave) is considered here in terms of labor. The prototype effort is estimated based on a total of 4 FTE postdocs + 1 FTE scientist + 0.5 FTE electrical techician (for repair) for the PRODUCTION.

WBS	Name	Cost
1.1.3.4.12	MILESTONE#1*: Contingency Stave available	$0

Notes

We assume it will take 2 weeks (10d) to put all the parts together to make the first prototype stave.

WBS	Name	Cost
1.1.3.4.13	Production Stave: final design	$35,096

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	400 hrs	0 days	Thu 10/31/02	Wed 1/22/03
8	Mech. Engineer-SiDet	100%	400 hrs	0 days	Thu 10/31/02	Wed 1/22/03
11	Mech. Technician-SiDet	25%	100 hrs	0 days	Thu 10/31/02	Wed 1/22/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$15,256		$0	$0	$15,256
8	Mech. Engineer-SiDet	100%	$16,940		$0	$0	$16,940
11	Mech. Technician-SiDet	25%	$2,900		$0	$0	$2,900

Notes

This is the final design of the mechanical stave and takes advantage of all possible tests done on the prototype staves.

WBS	Name	Cost
1.1.3.4.14	Production Stave: material and fixtures	$415,125

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 1/22/03	Wed 1/22/03	$276,750	$0	$0	$276,750
3	FNALCont	0%	0 hrs	0 days	Wed 1/22/03	Wed 1/22/03	$138,375	$0	$0	$138,375

Notes

This is the time needed at the machine shop to prepare all fixtures for production.
Material etc. could be purchaised in advance.
Cost:
We assume we re-do all fixtures in number adequate to sustain production.
1. mecanical stave related material and intermediate fixtures (120.75k total)
2. mechanical stave core assembly fixture (5k total) [*2]
3. laminating the bus cable fixture (3k) [*4]
5. One set of axial and stereo module alignment fixtures (15k each=30k) [*2]
6. stave wirebonding fixture (3k each) [*2]
7. stave inspection fixture (3k each)
8. stave storage boxes (0.5 each) [*100]
9. miscellanea material, testing boxes, storage cabinets etc. (25k total)

WBS	Name	Cost
1.1.3.4.15	Preproduction Stave: mechanical construction	$26,588

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	80 hrs	0 days	Mon 6/2/03	Mon 7/28/03
11	Mech. Technician-SiDet	250%	800 hrs	0 days	Mon 6/2/03	Mon 7/28/03
12	Research Associate	50%	160 hrs	0 days	Mon 6/2/03	Mon 7/28/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$3,388		$0	$0	$3,388
11	Mech. Technician-SiDet	250%	$23,200		$0	$0	$23,200
12	Research Associate	50%	$0		$0	$0	$0

Notes

This is to prepare more than 30 mechanical staves with the final design.
Preproduction is to build 24 electrical stave. We should be able to sustain a production rate of ~3 mechanical staves per day. Here we assume that we have a ramp-up at an average rate of ~ 1 stave/day.
Schedule:
The start date is driven by having finished the final stave design and the readiness of the production bus cable. Also we assume that we commit to the final fixture design during the previous tasks. This means that a certain number of identical fixtures need to be machined.
The end date is drivern by being ready for stave preproduction construction when all the other preproduction parts are ready.
Labor:
1. Mech. tech (200%) preparing parts and assembling
2. Mech. tech Specialist (50%) this is for support and troubleshooting
3. Mech Engineer (25%) support
4. Research Associate (50%) support

WBS	Name	Cost
1.1.3.4.16	Preproduction Stave: mechanicals available	$0

Notes

This is mechanical staves

WBS	Name	Cost
1.1.3.4.17	Preproduction Stave: mechanical testing	$6,334

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	40 hrs	0 days	Mon 6/16/03	Mon 7/14/03
11	Mech. Technician-SiDet	100%	160 hrs	0 days	Mon 6/16/03	Mon 7/14/03
12	Research Associate	25%	40 hrs	0 days	Mon 6/16/03	Mon 7/14/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$1,694		$0	$0	$1,694
11	Mech. Technician-SiDet	100%	$4,640		$0	$0	$4,640
12	Research Associate	25%	$0		$0	$0	$0

WBS	Name	Cost

"Preproduction Stave: mechanical testing" continued

Notes

This is all those remaining tests aimed at making sure that the design and assembling procedures are within our mechanical specs. Already extensive tests were made on the prototype stave. Nonetheless we need to re-verify for the production

1.1.3.4.18			Preproduction Stave: electrical assembly		$52,213

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	140 hrs	0 days	Wed 9/3/03	Thu 12/11/03
11	Mech. Technician-SiDet	225%	1,260 hrs	0 days	Wed 9/3/03	Thu 12/11/03
12	Research Associate	100%	560 hrs	0 days	Wed 9/3/03	Thu 12/11/03
13	CMM Programmer-SiDet	10%	56 hrs	0 days	Wed 9/3/03	Thu 12/11/03
14	Wirebonder-SiDet	50%	280 hrs	0 days	Wed 9/3/03	Thu 12/11/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$5,929		$0	$0	$5,929
11	Mech. Technician-SiDet	225%	$36,540		$0	$0	$36,540
12	Research Associate	100%	$0		$0	$0	$0
13	CMM Programmer-SiDet	10%	$1,624		$0	$0	$1,624
14	Wirebonder-SiDet	50%	$8,120		$0	$0	$8,120

Notes

Schedule:
This is driven by having preproduction modules available.
We will use production bus cables, production sensors
preproduction hybrids (we call these preproduction modules)
and preproduction Miniportcards.
We want to build 24 electrical staves during the ramp up period from June to September 2003.
This is a rate of ~2 complete staves/week.
Labor:
Labor:
1. Mech Technician (100%) installing/aligning modules on the stave
2. Mech Technician (50%) bonder
3. Mech Technician (75%) support, inspection etc.
4. Mech. Engineer (25%) support
5. Mech Tech Specialist (50%) support, troubleshooting
6. Research Associate (100%) support

1.1.3.4.19			Preproduction Stave: electricals available		$0

Notes

We assume it will take 2 weeks (10d) to put all the parts together to make the first prototype stave.

WBS		Name				Cost

1.1.3.4.20 — Preproduction Stave: electrical testing — $6,960

ID	Resource Name	Units	Work	Delay	Start	Finish
10	Elect. Technician-SiDet	50%	160 hrs	0 days	Wed 9/10/03	Tue 11/4/03
11	Mech. Technician-SiDet	25%	80 hrs	0 days	Wed 9/10/03	Tue 11/4/03
12	Research Associate	400%	1,280 hrs	0 days	Wed 9/10/03	Tue 11/4/03
15	Scientist	100%	320 hrs	0 days	Wed 9/10/03	Tue 11/4/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
10	Elect. Technician-SiDet	50%	$4,640	$0	$0	$4,640
11	Mech. Technician-SiDet	25%	$2,320	$0	$0	$2,320
12	Research Associate	400%	$0	$0	$0	$0
15	Scientist	100%	$0	$0	$0	$0

Notes

Labor:
This is ALL the electrical testing crew at FNAL. We don't divide it up between hybrid, modules, staves and burn-in stave parts. All SiDet electrical testing (up to the Stave) is considered here in terms of labor.
It is estimated to be a total of:
1. postdocs (400%)
2. scientist (100%) responsible for quality control
3. electrical techician (50%) for repair and minor support jobs
4. mech technician (25%) for repair/redo bonds

1.1.3.4.21 — Evaluation of preproduction staves — $21,384

ID	Resource Name	Units	Work	Delay	Start	Finish
7	Elect. Engineer	25%	80 hrs	0 days	Wed 9/10/03	Tue 11/4/03
8	Mech. Engineer-SiDet	25%	80 hrs	0 days	Wed 9/10/03	Tue 11/4/03
11	Mech. Technician-SiDet	100%	320 hrs	0 days	Wed 9/10/03	Tue 11/4/03
12	Research Associate	200%	640 hrs	0 days	Wed 9/10/03	Tue 11/4/03
13	CMM Programmer-SiDet	50%	160 hrs	0 days	Wed 9/10/03	Tue 11/4/03
15	Scientist	100%	320 hrs	0 days	Wed 9/10/03	Tue 11/4/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	25%	$4,076	$0	$0	$4,076
8	Mech. Engineer-SiDet	25%	$3,388	$0	$0	$3,388
11	Mech. Technician-SiDet	100%	$9,280	$0	$0	$9,280
12	Research Associate	200%	$0	$0	$0	$0
13	CMM Programmer-SiDet	50%	$4,640	$0	$0	$4,640
15	Scientist	100%	$0	$0	$0	$0

WBS	Name	Cost

"Evaluation of preproduction staves" continued

Notes

This is both a mechanical and electrical evaluation from the point of view of giving the green light to start production. We assume here minor modification to the entire production structure.
All this labor is ON TOP of the normal electrical testing labor.

1.1.3.4.22   MILESTONE#3: Stave Production go-ahead $0

Notes

This milestone allows to proceed into stave production.

1.1.3.4.23   Production Stave: modification to the final design $21,301

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	320 hrs	0 days	Wed 9/10/03	Tue 11/4/03
8	Mech. Engineer-SiDet	50%	160 hrs	0 days	Wed 9/10/03	Tue 11/4/03
11	Mech. Technician-SiDet	25%	80 hrs	0 days	Wed 9/10/03	Tue 11/4/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$12,205		$0	$0	$12,205
8	Mech. Engineer-SiDet	50%	$6,776		$0	$0	$6,776
11	Mech. Technician-SiDet	25%	$2,320		$0	$0	$2,320

Notes

This is a contingency task to modify the final design of the stave (fixtures etc.) and takes advantage of the tests done on the pre-production phase.

1.1.3.4.24   Production Stave: contingency material and fixtures $69,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 11/4/03	Tue 11/4/03	$46,000	$0	$0	$46,000
3	FNALCont	0%	0 hrs	0 days	Tue 11/4/03	Tue 11/4/03	$23,000	$0	$0	$23,000

Notes

Cost:
we assume that some fixture (or equivalent parts) needs to be redone or modified:
1. set of stave mechanical fixtures (10K)
2. bus cable laminating fixture (6k)
3. stave alignment fixture (20k)
4. more/modify boxes for storing/testing (10k total)

1.1.3.4.25   Production Stave: mechanical construction $48,536

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	160 hrs	0 days	Fri 1/16/04	Thu 5/6/04
11	Mech. Technician-SiDet	225%	1,440 hrs	0 days	Fri 1/16/04	Thu 5/6/04

WBS	Name	Cost

"Production Stave: mechanical construction" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
12	Research Associate	50%	320 hrs	0 days	Fri 1/16/04	Thu 5/6/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$6,776		$0	$0	$6,776
11	Mech. Technician-SiDet	225%	$41,760		$0	$0	$41,760
12	Research Associate	50%	$0		$0	$0	$0

Notes

This is to prepare ~200 mechanical staves with the final design.
Schedule:
We assume we can produce 3 mechanical staves/day: 240 staves = 80days
This task should start as soon as the mechanical is shown to work.
Labor:
Work is divided into 3 major sections:
a. preparation of parts (inlcudes bending peek tubing, cutting parts to size etc.)
b. laminating the bus cable to the carbon fiber sheet
c. putting all parts in a mold and glue them
1. Mech. tech (200%) preparing parts and assembling
2. Mech. tech Specialist (25%) this is for support and troubleshooting
3. Mech Engineer (25%) support
4. Research Associate (50%) support

1.1.3.4.26	Production Stave: mechanicals available	$0

1.1.3.4.27	Production Stave: electrical assembly	$144,540

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	400 hrs	0 days	Tue 2/10/04	Thu 11/18/04
11	Mech. Technician-SiDet	200%	3,200 hrs	0 days	Tue 2/10/04	Thu 11/18/04
12	Research Associate	100%	1,600 hrs	0 days	Tue 2/10/04	Thu 11/18/04
13	CMM Programmer-SiDet	25%	400 hrs	0 days	Tue 2/10/04	Thu 11/18/04
14	Wirebonder-SiDet	50%	800 hrs	0 days	Tue 2/10/04	Thu 11/18/04
15	Scientist	50%	800 hrs	0 days	Tue 2/10/04	Thu 11/18/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$16,940		$0	$0	$16,940
11	Mech. Technician-SiDet	200%	$92,800		$0	$0	$92,800
12	Research Associate	100%	$0		$0	$0	$0
13	CMM Programmer-SiDet	25%	$11,600		$0	$0	$11,600

WBS	Name	Cost

"Production Stave: electrical assembly" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
14	Wirebonder-SiDet	50%	$23,200	$0	$0	$23,200
15	Scientist	50%	$0	$0	$0	$0

Notes

Schedule:
This is driven by having preproduction modules available.
We will use production bus cables, production sensors
preproduction hybrids (we call these preproduction modules)
and preproduction Miniportcards.
We need to build electrical staves at a rate of >= 1 stave/day.
Labor:
1. Mech Technician (100%) installing/aligning modules on the stave
2. Mech Technician (50%) bonder
3. Mech Technician (75%) support, inspection etc.
4. Mech. Engineer (25%) support
5. Mech Tech Specialist (25%) support, troubleshooting
6. Research Associate (100%) support
7. Scientist (50%) supervision

1.1.3.4.28			Production Stave: electrical testing			$34,800

ID	Resource Name	Units	Work	Delay	Start	Finish
10	Elect. Technician-SiDet	50%	800 hrs	0 days	Tue 2/17/04	Mon 11/29/04
11	Mech. Technician-SiDet	25%	400 hrs	0 days	Tue 2/17/04	Mon 11/29/04
12	Research Associate	400%	6,400 hrs	0 days	Tue 2/17/04	Mon 11/29/04
15	Scientist	100%	1,600 hrs	0 days	Tue 2/17/04	Mon 11/29/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
10	Elect. Technician-SiDet	50%	$23,200	$0	$0	$23,200
11	Mech. Technician-SiDet	25%	$11,600	$0	$0	$11,600
12	Research Associate	400%	$0	$0	$0	$0
15	Scientist	100%	$0	$0	$0	$0

Notes

This is again ALL the electrical testing crew at FNAL. We don't divide it up between hybrid, modules, staves and burn-in stave parts. All SiDet electrical testing (up to the Stave) is
considered here in terms of labor.
It is estimated to be a total of:
1. postdocs (400%)
2. scientist (100%) responsible for quality control
3. electrical techician (50%) for repair and minor support jobs
4. mech technician (25%) bonder, for repair/redo bonds

WBS	Name	Cost
1.1.3.4.29	Production Staves Available	$0
1.1.3.4.30	Stave Production Complete	$0
1.1.4	Beampipe	$237,771

Notes

The beampipe is designed to be compatible with the old pipe (it has the same flanges to connect to the Tevatron beampipe). It is constructed from Beryllium for low mass, with short stainless steel sections on the end. We are considering a drilled technology rather than the traditional rolled technique. The pieces are the same OD and ID as the D0 pipe to minimize the total cost of the
CDF + D0 pipe. The pipes are not identical, CDFs is longer and has different flanges on the end.

1.1.4.1					Design beampipe		$12,878			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	50%	160 hrs	0 days	Mon 1/7/02	Fri 3/1/02	$6,102	$0	$0	$6,102
8	Mech. Engineer-SiDet	50%	160 hrs	0 days	Mon 1/7/02	Fri 3/1/02	$6,776	$0	$0	$6,776
15	Scientist	10%	32 hrs	0 days	Mon 1/7/02	Fri 3/1/02	$0	$0	$0	$0

Notes

CDF and D0 agreed on a wall thickness and radius for the Beryllium section of the pipes.
The reduces the total cost and also the delivery schedule.

1.1.4.2	Beampipe design complete	$0

Notes

Design finished and sent out for quotations on price for rolled and drilled pipes.

1.1.4.3					procure beampipe		$224,893			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 7/23/02	Tue 7/23/02	$149,893	$0	$0	$149,893
3	FNALCont	0%	0 hrs	0 days	Tue 7/23/02	Tue 7/23/02	$75,000	$0	$0	$75,000

Notes

Cost:
based on quotation n13002 Feb. 28, 02
$149,893 for a new drilled Be pipe.
add 50% cont. to cost.

1.1.4.4	Beampipe available	$0
1.1.5	Support Mechanics	$1,575,852

Notes

This section covers infrastucture, the support structures for the staves, barrels, L0, and transportation and installation at B0.
50% cont. is included on all costed items

WBS	Name	Cost
1.1.5.1	Mechanical Infrastructure	$200,000

Notes
Added appropriate contingency to all costed items

1.1.5.1.1 Procure 3m CMM $200,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$200,000	$0	$0	$200,000
3	FNALCont	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$0	$0	$0	$0

Notes
This was paid from by the Japanese in exchange for FNAL payment on sensors later

1.1.5.2 Silicon Support Structures $1,134,490

Notes
This task covers the bulkheads which support the staves, the screens which attach the bulkheads to each other, the tube which supprts the barrels (spacetube in Run IIa) and the support structure for L0.

1.1.5.2.1 Bulkheads $437,999

Notes
This task is comprehensive of:
1. 2 external and 2 internal CF bulkheads with precision Berillium (internal) and Al (external)   mounting features.
2. inner screen
3. fixtures for holding/aligning the bulkheads together

1.1.5.2.1.1 Bulkhead Initial Concept studies $36,442

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	50%	240 hrs	0 days	Mon 1/7/02	Fri 3/29/02	$9,154	$0	$0	$9,154
8	Mech. Engineer-SiDet	100%	480 hrs	0 days	Mon 1/7/02	Fri 3/29/02	$20,328	$0	$0	$20,328
11	Mech. Technician-SiDet	50%	240 hrs	0 days	Mon 1/7/02	Fri 3/29/02	$6,960	$0	$0	$6,960
12	Research Associate	50%	240 hrs	0 days	Mon 1/7/02	Fri 3/29/02	$0	$0	$0	$0

Notes
2/20/2002
We foresee the need for 4 (2 outer and 2 inner) Carbon Fiber bulkheads. Precision mounting pins with matching holes on the stave ensure alignment.
Prototype bulkheads made from G10 and leftover CF sheets
Labor:
mostly engineer type labor.

1.1.5.2.1.2 Bulkhead Prototype: Design $25,757

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	320 hrs	0 days	Mon 4/1/02	Fri 5/24/02	$12,205	$0	$0	$12,205

WBS	Name	Cost

"Bulkhead Prototype: Design" continued

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	320 hrs	0 days	Mon 4/1/02	Fri 5/24/02	$13,552	$0	$0	$13,552
12	Research Associate	50%	160 hrs	0 days	Mon 4/1/02	Fri 5/24/02	$0	$0	$0	$0

Notes

Cost:
This is to finalise the first prototype of a bulkhead design to test the concept.
Details of mounting hardware and fixturing will be included at this stage.
Detailed analysis of Bulkhead structure (FEA) will impact design.

1.1.5.2.1.3			Bulkhead Prototype: fabrication				$75,000			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Fri 5/24/02	Fri 5/24/02	$50,000	$0	$0	$50,000
3	FNALCont	0%	0 hrs	0 days	Fri 5/24/02	Fri 5/24/02	$25,000	$0	$0	$25,000

Notes

Cost:
we estimate the need for 2 CF bulkheads (inner and outer) plus a G-10 mockup.
This includes the cost of the fixture for locating the presicion pins.

1.1.5.2.1.4			Bulkhead Prototype: assembly and testing				$26,868

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	50%	240 hrs	0 days	Wed 7/24/02	Wed 10/16/02
11	Mech. Technician-SiDet	100%	480 hrs	0 days	Wed 7/24/02	Wed 10/16/02
13	CMM Programmer-SiDet	20%	96 hrs	0 days	Wed 7/24/02	Wed 10/16/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	50%	$10,164	$0	$0	$10,164
11	Mech. Technician-SiDet	100%	$13,920	$0	$0	$13,920
13	CMM Programmer-SiDet	20%	$2,784	$0	$0	$2,784

Notes

This is the labor associated with gluing the precision pins to the bulkheads in correct locations.
The alignment and construction of the fixture will be performed on a CMM.
The stiffness of the bulkheads will be tested. Installationl and positioning in a barrel will also be tested.

1.1.5.2.1.5			Bulkhead: Final Design				$25,757

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	320 hrs	0 days	Thu 10/17/02	Fri 12/13/02
8	Mech. Engineer-SiDet	100%	320 hrs	0 days	Thu 10/17/02	Fri 12/13/02

WBS	Name	Cost

"Bulkhead: Final Design" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
12	Research Associate	50%	160 hrs	0 days	Thu 10/17/02	Fri 12/13/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$12,205	$0	$0	$12,205
8	Mech. Engineer-SiDet	100%	$13,552	$0	$0	$13,552
12	Research Associate	50%	$0	$0	$0	$0

Notes

Design will be modified as needed by the results of the tests

1.1.5.2.1.6	Bulkhead Final Design Complete	$0

1.1.5.2.1.7	Bulkhead: fabrication	$195,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Fri 12/13/02	Fri 12/13/02	$130,000	$0	$0	$130,000
3	FNALCont	0%	0 hrs	0 days	Fri 12/13/02	Fri 12/13/02	$65,000	$0	$0	$65,000

Notes

Cost:
we estimate the cost to be 20K each CF bulkhead (4 + 2 spares) +10K for extra material.

1.1.5.2.1.8	Bulkhead: assembly, testing	$53,176

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	160 hrs	0 days	Thu 5/15/03	Mon 9/8/03
11	Mech. Technician-SiDet	200%	1,280 hrs	0 days	Thu 5/15/03	Mon 9/8/03
12	Research Associate	50%	320 hrs	0 days	Thu 5/15/03	Mon 9/8/03
13	CMM Programmer-SiDet	50%	320 hrs	0 days	Thu 5/15/03	Mon 9/8/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$6,776	$0	$0	$6,776
11	Mech. Technician-SiDet	200%	$37,120	$0	$0	$37,120
12	Research Associate	50%	$0	$0	$0	$0
13	CMM Programmer-SiDet	50%	$9,280	$0	$0	$9,280

Notes

Labor:
This includes the labor for gluing the pins to the bulkheads and
to test the quality of the bulkheads

1.1.5.2.1.9	Bulkheads Complete	$0

WBS	Name	Cost
1.1.5.2.2	screens	$398,746

Notes

These are the Inner and Outer screens for the outer barrel.

1.1.5.2.2.1				Design outer screen		$38,635

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	480 hrs	0 days	Mon 12/16/02	Wed 3/19/03
8	Mech. Engineer-SiDet	100%	480 hrs	0 days	Mon 12/16/02	Wed 3/19/03
12	Research Associate	25%	120 hrs	0 days	Mon 12/16/02	Wed 3/19/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$18,307	$0	$0	$18,307
8	Mech. Engineer-SiDet	100%	$20,328	$0	$0	$20,328
12	Research Associate	25%	$0	$0	$0	$0

Notes

This is the outer screen of the barrel. It holds the relative alignment of the bulkheads and provides protection for the staves.

1.1.5.2.2.2				Barrel outer screen: fabrication		$75,000			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 3/19/03	Wed 3/19/03	$50,000	$0	$0	$50,000
3	FNALCont	0%	0 hrs	0 days	Wed 3/19/03	Wed 3/19/03	$25,000	$0	$0	$25,000

Notes

This is the cost to fabricate the screens, assuming we buy them rather than make them in house.

1.1.5.2.2.3				Support tube fabrication		$135,000			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 3/19/03	Wed 3/19/03	$90,000	$0	$0	$90,000
3	FNALCont	0%	0 hrs	0 days	Wed 3/19/03	Wed 3/19/03	$45,000	$0	$0	$45,000

Notes

This is the equivalent of the spacetube in runIIa. It supports the barrels and spans the distance between the mounts for SVXIIb on ISL. The cost assumes fabrication outside FNAL

1.1.5.2.2.4				Design and Fabricate screen installation fixture		$67,555

ID	Resource Name	Units	Work	Delay	Start	Finish
1	FNALEQ	0%	0 hrs	0 days	Wed 3/19/03	Wed 3/19/03
3	FNALCont	0%	0 hrs	0 days	Wed 3/19/03	Wed 3/19/03
6	Designer-SiDet	100%	480 hrs	0 days	Thu 3/20/03	Thu 6/12/03
8	Mech. Engineer-SiDet	100%	480 hrs	0 days	Thu 3/20/03	Thu 6/12/03

WBS		Name				Cost

"Design and Fabricate screen installation fixture" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
11	Mech. Technician-SiDet	100%	480 hrs	0 days	Thu 3/20/03	Thu 6/12/03
12	Research Associate	50%	240 hrs	0 days	Thu 3/20/03	Thu 6/12/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	$10,000	$0	$0	$10,000
3	FNALCont	0%	$5,000	$0	$0	$5,000
6	Designer-SiDet	100%	$18,307	$0	$0	$18,307
8	Mech. Engineer-SiDet	100%	$20,328	$0	$0	$20,328
11	Mech. Technician-SiDet	100%	$13,920	$0	$0	$13,920
12	Research Associate	50%	$0	$0	$0	$0

Notes

This fixture holds the barrels and screen while the screen is glued to the bulkheads

1.1.5.2.2.5		Design and Fabricate support cradle				$82,555

ID	Resource Name	Units	Work	Delay	Start	Finish
1	FNALEQ	0%	0 hrs	0 days	Thu 6/12/03	Thu 6/12/03
3	FNALCont	0%	0 hrs	0 days	Thu 6/12/03	Thu 6/12/03
6	Designer-SiDet	100%	480 hrs	0 days	Fri 6/13/03	Mon 9/8/03
8	Mech. Engineer-SiDet	100%	480 hrs	0 days	Fri 6/13/03	Mon 9/8/03
11	Mech. Technician-SiDet	100%	480 hrs	0 days	Fri 6/13/03	Mon 9/8/03
12	Research Associate	50%	240 hrs	0 days	Fri 6/13/03	Mon 9/8/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	$20,000	$0	$0	$20,000
3	FNALCont	0%	$10,000	$0	$0	$10,000
6	Designer-SiDet	100%	$18,307	$0	$0	$18,307
8	Mech. Engineer-SiDet	100%	$20,328	$0	$0	$20,328
11	Mech. Technician-SiDet	100%	$13,920	$0	$0	$13,920
12	Research Associate	50%	$0	$0	$0	$0

Notes

This cradle supports the space tube while the barrels and installed and aligned. It is mounted on
roller bearings which ride the rails on the CMM. This allows it to move around during installation of the beampipe and during installation into ISL.

1.1.5.2.3		Layer 0	$297,745

Notes

This is the Carbon Fiber Support for L0. It is mounted on outer bulkheads and has an integrated cooling system. This includes the structure which supports and cools the hybrids

WBS	Name	Cost

"Layer 0 " continued

Notes

ouside the end of the barrel.

1.1.5.2.3.1   CF Support Prototype: design $51,514

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	640 hrs	0 days	Mon 4/1/02	Tue 7/23/02	$24,410	$0	$0	$24,410
8	Mech. Engineer-SiDet	100%	640 hrs	0 days	Mon 4/1/02	Tue 7/23/02	$27,104	$0	$0	$27,104
12	Research Associate	50%	320 hrs	0 days	Mon 4/1/02	Tue 7/23/02	$0	$0	$0	$0

Notes

The assumption is that the L0 CF support structure design starts together with the design of the bulk head. This includes the support sturcture for the L0 hybrids which extend outside the outer barrel in z.

1.1.5.2.3.2   CF Support Prototype: manufacturing $75,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Tue 7/23/02	Tue 7/23/02	$50,000	$0	$0	$50,000
3	FNALCont	0%	0 hrs	0 days	Tue 7/23/02	Tue 7/23/02	$25,000	$0	$0	$25,000

Notes

Fabrication of the first prototype of the CF support structure for L0.
The above fabrication is supposed to take 5 months.

1.1.5.2.3.3   CF Support Prototype: evaluation and testing $26,868

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	50%	240 hrs	0 days	Mon 7/7/03	Mon 9/29/03
11	Mech. Technician-SiDet	100%	480 hrs	0 days	Mon 7/7/03	Mon 9/29/03
12	Research Associate	100%	480 hrs	0 days	Mon 7/7/03	Mon 9/29/03
13	CMM Programmer-SiDet	20%	96 hrs	0 days	Mon 7/7/03	Mon 9/29/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	50%	$10,164	$0	$0	$10,164
11	Mech. Technician-SiDet	100%	$13,920	$0	$0	$13,920
12	Research Associate	100%	$0	$0	$0	$0
13	CMM Programmer-SiDet	20%	$2,784	$0	$0	$2,784

Notes

Testing consists of both mechanical and electrical since now pre-production L0 modules are available.

WBS	Name	Cost
1.1.5.2.3.4	CF Support: Design	$19,318

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	240 hrs	0 days	Mon 8/18/03	Mon 9/29/03
8	Mech. Engineer-SiDet	100%	240 hrs	0 days	Mon 8/18/03	Mon 9/29/03
12	Research Associate	50%	120 hrs	0 days	Mon 8/18/03	Mon 9/29/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$9,154	$0	$0	$9,154
8	Mech. Engineer-SiDet	100%	$10,164	$0	$0	$10,164
12	Research Associate	50%	$0	$0	$0	$0

Notes

This is the final design for the L0 Cf support structure and the hybrid support structure

WBS	Name	Cost
1.1.5.2.3.5	CF Support: manufacturing	$75,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Mon 9/29/03	Mon 9/29/03	$50,000	$0	$0	$50,000
3	FNALCont	0%	0 hrs	0 days	Mon 9/29/03	Mon 9/29/03	$25,000	$0	$0	$25,000

Notes

As for the prototype we assume 5 months for the production of the CF support structure.
The cost assumes we purchase the structure rather than build it in house.

WBS	Name	Cost
1.1.5.2.3.6	CF Support: assembly and test	$50,046

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	75%	360 hrs	0 days	Thu 3/4/04	Thu 5/27/04
11	Mech. Technician-SiDet	200%	960 hrs	0 days	Thu 3/4/04	Thu 5/27/04
12	Research Associate	100%	480 hrs	0 days	Thu 3/4/04	Thu 5/27/04
13	CMM Programmer-SiDet	50%	240 hrs	0 days	Thu 3/4/04	Thu 5/27/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	75%	$15,246	$0	$0	$15,246
11	Mech. Technician-SiDet	200%	$27,840	$0	$0	$27,840
12	Research Associate	100%	$0	$0	$0	$0
13	CMM Programmer-SiDet	50%	$6,960	$0	$0	$6,960

Notes

Tests include alignment and cooling tests for hybrid structure and for silicon supports

WBS	Name	Cost
1.1.5.2.3.7	L0 Supports Complete	$0

WBS	Name	Cost
1.1.5.3	Transportation Fixtures	$67,636

Notes

This is the fixture for transporting ISL+SVXIIa or ISL+SVXIIb from/to the Assembly Hall.
It has to be finished before runiia ends. The fixtures for Run IIa will be reused as much as possible

1.1.5.3.1	transportation fixture: updating design	$13,552

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	100%	320 hrs	0 days	Thu 1/15/04	Wed 3/10/04
12	Research Associate	50%	160 hrs	0 days	Thu 1/15/04	Wed 3/10/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	$13,552	$0	$0	$13,552
12	Research Associate	50%	$0	$0	$0	$0

Notes

This is the labor cost to update the design of the Run IIa transportation fixture

1.1.5.3.2	transportation fixture: fabrication	$30,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 3/10/04	Wed 3/10/04	$20,000	$0	$0	$20,000
3	FNALCont	0%	0 hrs	0 days	Wed 3/10/04	Wed 3/10/04	$10,000	$0	$0	$10,000

Notes

This is the cost to refabricate the transportation fixtures.

1.1.5.3.3	transportation fixture: final assembling and test	$24,084

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	50%	240 hrs	0 days	Thu 5/6/04	Fri 7/30/04	$10,164	$0	$0	$10,164
11	Mech. Technician-SiDet	100%	480 hrs	0 days	Thu 5/6/04	Fri 7/30/04	$13,920	$0	$0	$13,920
12	Research Associate	50%	240 hrs	0 days	Thu 5/6/04	Fri 7/30/04	$0	$0	$0	$0

Notes

This is the labor for assembly of the transportation fixure

1.1.5.4	Positioning system (inchworms)	$62,621

Notes

This system allows adjustment of the position of the entire silicon detector (ISL+SVXIIb+L0+ beampipe) relative the the outer tracker (COT) and the beamline.

WBS	Name	Cost
1.1.5.4.1	positioning jacks(inchworms): design	$15,593

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	320 hrs	0 days	Thu 10/17/02	Fri 12/13/02
8	Mech. Engineer-SiDet	25%	80 hrs	0 days	Thu 10/17/02	Fri 12/13/02
12	Research Associate	50%	160 hrs	0 days	Thu 10/17/02	Fri 12/13/02
16	NonFnal Labor	100%	320 hrs	0 days	Thu 10/17/02	Fri 12/13/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$12,205	$0	$0	$12,205
8	Mech. Engineer-SiDet	25%	$3,388	$0	$0	$3,388
12	Research Associate	50%	$0	$0	$0	$0
16	NonFnal Labor	100%	$0	$0	$0	$0

Notes

This is the replacement for the remote positioning system (the inchworms) which attach to the outer flange of ISL and COT. These will be mechanical jacks that can only be adjusted when the plugs are open.
Labor:
design will be done in collaboration with U.Toronto.

WBS	Name	Cost
1.1.5.4.2	positioning jack prototype manufacturing	$9,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Fri 12/13/02	Fri 12/13/02	$6,000	$0	$0	$6,000
3	FNALCont	0%	0 hrs	0 days	Fri 12/13/02	Fri 12/13/02	$3,000	$0	$0	$3,000

Notes

Cost:
Based on IIa experience
This is the cost of manufacturing the prototype hardware.
This may be covered by U. Toronto depending on a grant.

WBS	Name	Cost
1.1.5.4.3	Prototype positioning jack testing	$0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	NonFnal Labor	200%	640 hrs	0 days	Thu 2/20/03	Wed 4/16/03	$0	$0	$0	$0

Notes

Labor:
This will be done by physicists at Toronto.
Estimated to be 2 FTE.

Basis of Estimate as of Mon 4/15/02
RunIIbTotal

WBS	Name	Cost
1.1.5.4.4	positioning jacks: manufacturing	$30,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 4/16/03	Wed 4/16/03	$20,000	$0	$0	$20,000
3	FNALCont	0%	0 hrs	0 days	Wed 4/16/03	Wed 4/16/03	$10,000	$0	$0	$10,000

Notes

Cost:
Based on experience with Run IIa.
Toronto may cover some of the costs.
Esitamte 10k$ for jacks and 10k$ for new pieces to attach to COT.
Contingency is 50%.

WBS	Name	Cost
1.1.5.4.5	positioning jacks: Assemble and test	$8,028

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	80 hrs	0 days	Fri 6/13/03	Fri 8/8/03	$3,388	$0	$0	$3,388
11	Mech. Technician-SiDet	50%	160 hrs	0 days	Fri 6/13/03	Fri 8/8/03	$4,640	$0	$0	$4,640
12	Research Associate	50%	160 hrs	0 days	Fri 6/13/03	Fri 8/8/03	$0	$0	$0	$0
16	NonFnal Labor	200%	640 hrs	0 days	Fri 6/13/03	Fri 8/8/03	$0	$0	$0	$0

Notes

Labor:
This assembly and testing will mostly be done at Toronto.
Above labor estimted to be 2 FTE
Some eng, and tech. time will be needed for tests and FNAL

WBS	Name	Cost
1.1.5.5	Installation of SVXIIb into ISL	$111,105

Notes

These are the fixtures that allows for both extracting SVXIIa from IL and inserting SVXIIb into ISL.
Schedule:
This task needs to be done in time for the removal of SVXIIa from ISL

WBS	Name	Cost
1.1.5.5.1	Design Fixtures for removal of SVXII and installation of SVXIIB	$25,757

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	320 hrs	0 days	Thu 1/15/04	Wed 3/10/04
8	Mech. Engineer-SiDet	100%	320 hrs	0 days	Thu 1/15/04	Wed 3/10/04
12	Research Associate	50%	160 hrs	0 days	Thu 1/15/04	Wed 3/10/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$12,205	$0	$0	$12,205
8	Mech. Engineer-SiDet	100%	$13,552	$0	$0	$13,552
12	Research Associate	50%	$0	$0	$0	$0

WBS	Name	Cost

"Design Fixtures for removal of SVXII and installation of SVXIIB" continued

Notes
Schedule:
This task needs to be done in time for the removal of SVXIIa from ISL

1.1.5.5.2 Fabricate fixtures for SVX removal and installation of SVXIIb $75,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 3/10/04	Wed 3/10/04	$50,000	$0	$0	$50,000
3	FNALCont	0%	0 hrs	0 days	Wed 3/10/04	Wed 3/10/04	$25,000	$0	$0	$25,000

Notes
Cost:
based on engineering estimate and IIa experience.
This is the cost to purchase the fixtures from outside.
50% contingency added.

1.1.5.5.3 bly and Test fixtures for SVX removal and installation of SVXIIb $10,348

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	50%	80 hrs	0 days	Fri 6/4/04	Thu 7/1/04	$3,388	$0	$0	$3,388
11	Mech. Technician-SiDet	100%	160 hrs	0 days	Fri 6/4/04	Thu 7/1/04	$4,640	$0	$0	$4,640
12	Research Associate	50%	80 hrs	0 days	Fri 6/4/04	Thu 7/1/04	$0	$0	$0	$0
13	CMM Programmer-SiDet	50%	80 hrs	0 days	Fri 6/4/04	Thu 7/1/04	$2,320	$0	$0	$2,320

Notes
Labor:
This involves alignment and assembly of fixtures on the cmm at Sidet

1.1.6 Cooling and Monitoring $213,238

Notes
Thisi task covers the cooling system, the monitoring of the cooling and power to the detectors and the position monitors (RASNIKS)
50% cont. is included on all costed items

1.1.6.1 Cooling systems $153,238

Notes
This task covers updating the cooling system at Sidet and B0 and the cost of new manifolds at the detector.

1.1.6.1.1 Update Sidet cooling system $26,056

ID	Resource Name	Units	Work	Delay	Start	Finish
1	FNALEQ	0%	0 hrs	0 days	Wed 10/16/02	Wed 10/16/02
8	Mech. Engineer-SiDet	50%	160 hrs	0 days	Thu 10/17/02	Fri 12/13/02

WBS	Name	Cost

"Update Sidet cooling system" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
11	Mech. Technician-SiDet	100%	320 hrs	0 days	Thu 10/17/02	Fri 12/13/02
12	Research Associate	50%	160 hrs	0 days	Thu 10/17/02	Fri 12/13/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	$10,000		$0	$0	$10,000
8	Mech. Engineer-SiDet	50%	$6,776		$0	$0	$6,776
11	Mech. Technician-SiDet	100%	$9,280		$0	$0	$9,280
12	Research Associate	50%	$0		$0	$0	$0

Notes

This is the cooling system that will be used during barrel construction testing of staves.
Labor:
some work is needed to upgrade the existing system.
Mostly a mech tech with some support.

WBS	Name	Cost
1.1.6.1.2	Build internal manifolds	$54,084

ID	Resource Name	Units	Work	Delay	Start	Finish
1	FNALEQ	0%	0 hrs	0 days	Wed 10/16/02	Wed 10/16/02
3	FNALCont	0%	0 hrs	0 days	Wed 10/16/02	Wed 10/16/02
8	Mech. Engineer-SiDet	50%	240 hrs	0 days	Thu 10/17/02	Wed 1/22/03
11	Mech. Technician-SiDet	100%	480 hrs	0 days	Thu 10/17/02	Wed 1/22/03
12	Research Associate	50%	240 hrs	0 days	Thu 10/17/02	Wed 1/22/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	$20,000		$0	$0	$20,000
3	FNALCont	0%	$10,000		$0	$0	$10,000
8	Mech. Engineer-SiDet	50%	$10,164		$0	$0	$10,164
11	Mech. Technician-SiDet	100%	$13,920		$0	$0	$13,920
12	Research Associate	50%	$0		$0	$0	$0

Notes

These are the manifolds that receive a single cooling line from the slots and connect it to multiple stave circuits.
Cost:
based on IIa experience
Labor:
Needed for testing and assembling of parts.
Moslty a mech. tech. + support.

WBS	Name	Cost
1.1.6.1.3	production chiller components, manifolds, control valves	$73,098

ID	Resource Name	Units	Work	Delay	Start	Finish
1	FNALEQ	0%	0 hrs	0 days	Wed 1/22/03	Wed 1/22/03
3	FNALCont	0%	0 hrs	0 days	Wed 1/22/03	Wed 1/22/03
8	Mech. Engineer-SiDet	50%	280 hrs	0 days	Thu 1/23/03	Wed 4/30/03
11	Mech. Technician-SiDet	100%	560 hrs	0 days	Thu 1/23/03	Wed 4/30/03
12	Research Associate	50%	280 hrs	0 days	Thu 1/23/03	Wed 4/30/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	$30,000	$0	$0	$30,000
3	FNALCont	0%	$15,000	$0	$0	$15,000
8	Mech. Engineer-SiDet	50%	$11,858	$0	$0	$11,858
11	Mech. Technician-SiDet	100%	$16,240	$0	$0	$16,240
12	Research Associate	50%	$0	$0	$0	$0

Notes

Cost:
These are the costs associated with updating the chillers at B0. The cost is based on an email from Rich Stanek (engineer estimate) in Sept. 01.
Labor:
Mostly a mech. tech + support.

1.1.6.2	Interlocks	$30,000

Notes

This is the system that montors the power and temperature of the detectors.
It will resue most of the existing system.

1.1.6.2.1	Upgrade existing system	$30,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Thu 2/19/04	Thu 2/19/04	$15,000	$0	$0	$15,000
3	FNALCont	0%	0 hrs	0 days	Thu 2/19/04	Thu 2/19/04	$15,000	$0	$0	$15,000
12	Research Associate	50%	800 hrs	0 days	Fri 2/20/04	Thu 12/2/04	$0	$0	$0	$0

Notes

Cost:
Physicist estimate.
This is the cost to upgrade the interlock system for Run IIb. additional temperature and current channels will be needed

1.1.6.3	Position Monitoring	$30,000

Notes

This is to update the esisting position monitoring system (RASNIK).
Cost is based on Run IIa experience and resuing the DAQ already setup.
Labor:

WBS	Name	Cost

"Position Monitoring" continued

Notes

there is no FNAL labor for this task, Toronto is taking on this project

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1.1.6.3.1   Rasnik Prototype manufacturing and test $0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
16	NonFnal Labor	150%	1,200 hrs	0 days	Thu 10/17/02	Wed 3/19/03	$0	$0	$0	$0

Notes

This covers the cost to make and test a Rasnik module.
Cost:
Toronto will cover some or all of this cost.
Labor:
assembling and test done at U.Toronto.
Estimated to be 1.5 FTE

1.1.6.3.2   Rasnik Production $30,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 3/19/03	Wed 3/19/03	$20,000	$0	$0	$20,000
3	FNALCont	0%	0 hrs	0 days	Wed 3/19/03	Wed 3/19/03	$10,000	$0	$0	$10,000
16	NonFnal Labor	200%	640 hrs	0 days	Thu 3/20/03	Wed 5/14/03	$0	$0	$0	$0

Notes

Cost:
Cost is based on cost to fabricate additional modules with assembling.
Cost/module comes from UCLA experience on IIa.
Labor:
testing of modules will be done at U.Toronto
estimated 2 FTE

1.1.6.3.3   Rasniks Complete $0

1.1.7   Final Assembly (Installation and Integration) $673,723

Notes

This task covers installation of staves into the barrels, installation of L0 modules on the CF supports
and the integration of L0 and beampipe with the outer barrel
Added 50% contingency to all costed items

1.1.7.1   Stave Intallation (Outer) $317,855

Notes

This covers installation of all layers except for L0.

WBS	Name	Cost
1.1.7.1.1	Prototype stave installation fixture: R&D	$70,757

ID	Resource Name	Units	Work	Delay	Start	Finish
2	FNALR&D	0%	0 hrs	0 days	Fri 5/24/02	Fri 5/24/02
3	FNALCont	0%	0 hrs	0 days	Fri 5/24/02	Fri 5/24/02
6	Designer-SiDet	50%	320 hrs	0 days	Tue 5/28/02	Wed 9/18/02
8	Mech. Engineer-SiDet	50%	320 hrs	0 days	Tue 5/28/02	Wed 9/18/02
12	Research Associate	50%	320 hrs	0 days	Tue 5/28/02	Wed 9/18/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	$30,000		$0	$0	$30,000
3	FNALCont	0%	$15,000		$0	$0	$15,000
6	Designer-SiDet	50%	$12,205		$0	$0	$12,205
8	Mech. Engineer-SiDet	50%	$13,552		$0	$0	$13,552
12	Research Associate	50%	$0		$0	$0	$0

Notes

This is all the r&d needed to prototype the installation and alignment of staves in the outer barrel.

WBS	Name	Cost
1.1.7.1.2	Stave installation fixtures: design	$18,981

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	320 hrs	0 days	Mon 12/16/02	Wed 2/19/03
8	Mech. Engineer-SiDet	50%	160 hrs	0 days	Mon 12/16/02	Wed 2/19/03
12	Research Associate	50%	160 hrs	0 days	Mon 12/16/02	Wed 2/19/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$12,205		$0	$0	$12,205
8	Mech. Engineer-SiDet	50%	$6,776		$0	$0	$6,776
12	Research Associate	50%	$0		$0	$0	$0

Notes

Final Stave installation fixture design will start as soon as the final bulk-head design is finished and the R&D is completed.

WBS	Name	Cost
1.1.7.1.3	Stave installation fixtures: fabrication	$105,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 2/19/03	Wed 2/19/03	$70,000	$0	$0	$70,000
3	FNALCont	0%	0 hrs	0 days	Wed 2/19/03	Wed 2/19/03	$35,000	$0	$0	$35,000

Notes

These fixtures are larger than Run IIa and thus will be more expensive. Cost is estijmated from RunIIa costs (50k)

WBS	Name	Cost
1.1.7.1.4	Stave installation fixture: setup and Alignment	$21,635

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	100 hrs	0 days	Thu 5/15/03	Fri 7/25/03
11	Mech. Technician-SiDet	100%	400 hrs	0 days	Thu 5/15/03	Fri 7/25/03
12	Research Associate	25%	100 hrs	0 days	Thu 5/15/03	Fri 7/25/03
13	CMM Programmer-SiDet	50%	200 hrs	0 days	Thu 5/15/03	Fri 7/25/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$4,235		$0	$0	$4,235
11	Mech. Technician-SiDet	100%	$11,600		$0	$0	$11,600
12	Research Associate	25%	$0		$0	$0	$0
13	CMM Programmer-SiDet	50%	$5,800		$0	$0	$5,800

Notes

This will be setup on a CMM and mechanical staves will be used to test the installation procedures.

WBS	Name	Cost
1.1.7.1.5	Bulkhead installation and alignment	$10,974

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	40 hrs	0 days	Tue 9/9/03	Mon 10/6/03
11	Mech. Technician-SiDet	100%	160 hrs	0 days	Tue 9/9/03	Mon 10/6/03
12	Research Associate	50%	80 hrs	0 days	Tue 9/9/03	Mon 10/6/03
13	CMM Programmer-SiDet	100%	160 hrs	0 days	Tue 9/9/03	Mon 10/6/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$1,694		$0	$0	$1,694
11	Mech. Technician-SiDet	100%	$4,640		$0	$0	$4,640
12	Research Associate	50%	$0		$0	$0	$0
13	CMM Programmer-SiDet	100%	$4,640		$0	$0	$4,640

Notes

Bulkheads must be precisely aligned to each other and to the CMM reference system.

WBS	Name	Cost
1.1.7.1.6	Ready for stave installation	$0
1.1.7.1.7	Installation of staves	$57,282

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	10%	120 hrs	0 days	Tue 2/24/04	Thu 9/23/04
11	Mech. Technician-SiDet	100%	1,200 hrs	0 days	Tue 2/24/04	Thu 9/23/04
12	Research Associate	75%	900 hrs	0 days	Tue 2/24/04	Thu 9/23/04
13	CMM Programmer-SiDet	50%	600 hrs	0 days	Tue 2/24/04	Thu 9/23/04

WBS	Name	Cost

"Installation of staves" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	10%	$5,082	$0	$0	$5,082
11	Mech. Technician-SiDet	100%	$34,800	$0	$0	$34,800
12	Research Associate	75%	$0	$0	$0	$0
13	CMM Programmer-SiDet	50%	$17,400	$0	$0	$17,400

Notes

Labor:
estimated based on runII experience.
Installing and aligning/measuring staves should be a rather fast task. We foresee that it will be done in batches (i.e. wait for a certain number of staves to be ready for installation and the install them).
This is a task that spans the 200 days of stave production but in reality it takes less then 200 days to be accomplished.
We assume that the labor is required for 3/4 of the available time (i.e. 3/4*200 = 150 days worth of labor)

1.1.7.1.8			Installation of Stave: electrical testing			$0			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
12	Research Associate	150%	1,800 hrs	0 days	Tue 3/16/04	Thu 10/14/04	$0	$0	$0	$0
15	Scientist	25%	300 hrs	0 days	Tue 3/16/04	Thu 10/14/04	$0	$0	$0	$0

Notes

Labor:
This is ALL the electrical testing crew at FNAL. We don't divide it up between hybrid, modules, staves and burn-in stave parts. All SiDet electrical testing (up to the Stave) is considered here in terms of labor. It is estimated to be a total of 4 FTE postdocs + 1 FTE scientist + 0.5 FTE electrical techician (for repair).
This is a task that spans the 200 days of stave production but in reality it takes less then 200 days to be accomplished.
We conservatively assume that testing labor is required during the entire assembling time.

1.1.7.1.9	Stave installation complete	$0

1.1.7.1.10	Final system tests	$17,704

ID	Resource Name	Units	Work	Delay	Start	Finish
7	Elect. Engineer	50%	80 hrs	0 days	Tue 12/21/04	Wed 1/26/05
8	Mech. Engineer-SiDet	50%	80 hrs	0 days	Tue 12/21/04	Wed 1/26/05
9	Elect. Technician	25%	40 hrs	0 days	Tue 12/21/04	Wed 1/26/05
11	Mech. Technician-SiDet	200%	320 hrs	0 days	Tue 12/21/04	Wed 1/26/05
12	Research Associate	400%	640 hrs	0 days	Tue 12/21/04	Wed 1/26/05
15	Scientist	100%	160 hrs	0 days	Tue 12/21/04	Wed 1/26/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	$4,076	$0	$0	$4,076
8	Mech. Engineer-SiDet	50%	$3,388	$0	$0	$3,388

WBS	Name	Cost

"Final system tests" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	25%	$960	$0	$0	$960
11	Mech. Technician-SiDet	200%	$9,280	$0	$0	$9,280
12	Research Associate	400%	$0	$0	$0	$0
15	Scientist	100%	$0	$0	$0	$0

Notes

This is the final system test. Goal should be to establish that all staves are working, cooling is working and everything is aligned to specs.

1.1.7.1.11 Installation outer screen $6,334

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	40 hrs	0 days	Thu 1/13/05	Wed 2/9/05	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	100%	160 hrs	0 days	Thu 1/13/05	Wed 2/9/05	$4,640	$0	$0	$4,640
12	Research Associate	50%	80 hrs	0 days	Thu 1/13/05	Wed 2/9/05	$0	$0	$0	$0

Notes

Schedule:
based on the time required for the iia silicon system

1.1.7.1.12 Installation of barrel in spacetube $5,174

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	50%	40 hrs	0 days	Thu 2/10/05	Wed 2/23/05
11	Mech. Technician-SiDet	100%	80 hrs	0 days	Thu 2/10/05	Wed 2/23/05
12	Research Associate	50%	40 hrs	0 days	Thu 2/10/05	Wed 2/23/05
13	CMM Programmer-SiDet	50%	40 hrs	0 days	Thu 2/10/05	Wed 2/23/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	50%	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	100%	$2,320	$0	$0	$2,320
12	Research Associate	50%	$0	$0	$0	$0
13	CMM Programmer-SiDet	50%	$1,160	$0	$0	$1,160

Notes

Schedule:
based on the time required for the iia silicon system
The barrels are placed in the space tube and then aligned.

WBS	Name	Cost
1.1.7.1.13	dressing of cables and cooling	$4,014

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	50%	40 hrs	0 days	Thu 2/10/05	Wed 2/23/05
11	Mech. Technician-SiDet	100%	80 hrs	0 days	Thu 2/10/05	Wed 2/23/05
12	Research Associate	200%	160 hrs	0 days	Thu 2/10/05	Wed 2/23/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	50%	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	100%	$2,320	$0	$0	$2,320
12	Research Associate	200%	$0	$0	$0	$0

Notes

Schedule:
based on the time required for the iia silicon system

WBS	Name	Cost
1.1.7.1.14	Outer Detector Complete	$0
1.1.7.2	L0 Installation (Inner)	$150,645
1.1.7.2.1	L0 module installation fixtures: design	$25,757

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	100%	320 hrs	0 days	Wed 7/24/02	Wed 9/18/02
8	Mech. Engineer-SiDet	100%	320 hrs	0 days	Wed 7/24/02	Wed 9/18/02

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	$12,205	$0	$0	$12,205
8	Mech. Engineer-SiDet	100%	$13,552	$0	$0	$13,552

Notes

This is the time estimated from Run IIa experience

WBS	Name	Cost
1.1.7.2.2	L0 module installation fixtures: fabrication	$60,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 9/18/02	Wed 9/18/02	$40,000	$0	$0	$40,000
3	FNALCont	0%	0 hrs	0 days	Wed 9/18/02	Wed 9/18/02	$20,000	$0	$0	$20,000

Notes

Cost:
2 fixtures at 20k each based on experience with Run iia l00 design

WBS	Name	Cost
1.1.7.2.3	L0 module installation fixtures: assembly and test	$6,334

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	40 hrs	0 days	Mon 12/16/02	Wed 1/22/03
11	Mech. Technician-SiDet	100%	160 hrs	0 days	Mon 12/16/02	Wed 1/22/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	100%	$4,640	$0	$0	$4,640

Notes

This task involves testing installation and alignment procedures. It is based on Run IIa experience with L00.

WBS	Name	Cost
1.1.7.2.4	Install L0 supports on beam pipe	$9,722

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	75%	120 hrs	0 days	Fri 5/28/04	Thu 6/24/04	$5,082	$0	$0	$5,082
11	Mech. Technician-SiDet	100%	160 hrs	0 days	Fri 5/28/04	Thu 6/24/04	$4,640	$0	$0	$4,640
12	Research Associate	50%	80 hrs	0 days	Fri 5/28/04	Thu 6/24/04	$0	$0	$0	$0

Notes

these are stand offs between the beampipe and the inner surface of L0. They may not be needed.

WBS	Name	Cost
1.1.7.2.5	Installation of L0 Modules	$6,381

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	10%	19.2 hrs	0 days	Fri 6/25/04	Thu 7/29/04	$813	$0	$0	$813
11	Mech. Technician-SiDet	100%	192 hrs	0 days	Fri 6/25/04	Thu 7/29/04	$5,568	$0	$0	$5,568
12	Research Associate	100%	192 hrs	0 days	Fri 6/25/04	Thu 7/29/04	$0	$0	$0	$0

Notes

we expect to do at least 3 modules/day: 144 modules = 24 days
based on Run iia experience with L00

WBS	Name	Cost
1.1.7.2.6	Dressing of HDIs	$2,659

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	10%	8 hrs	0 days	Fri 7/30/04	Thu 8/12/04	$339	$0	$0	$339
11	Mech. Technician-SiDet	100%	80 hrs	0 days	Fri 7/30/04	Thu 8/12/04	$2,320	$0	$0	$2,320
12	Research Associate	100%	80 hrs	0 days	Fri 7/30/04	Thu 8/12/04	$0	$0	$0	$0

Notes

Time estimated from L00 experience

WBS	Name					Cost			

1.1.7.2.7 — L0 System Tests — $31,230

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	240 hrs	0 days	Fri 7/30/04	Fri 10/22/04	$12,228	$0	$0	$12,228
8	Mech. Engineer-SiDet	25%	120 hrs	0 days	Fri 7/30/04	Fri 10/22/04	$5,082	$0	$0	$5,082
11	Mech. Technician-SiDet	100%	480 hrs	0 days	Fri 7/30/04	Fri 10/22/04	$13,920	$0	$0	$13,920
12	Research Associate	200%	960 hrs	0 days	Fri 7/30/04	Fri 10/22/04	$0	$0	$0	$0
15	Scientist	100%	480 hrs	0 days	Fri 7/30/04	Fri 10/22/04	$0	$0	$0	$0

Notes

These tests will determine final grounding and shielding

1.1.7.2.8 — Installation of Screens — $8,562

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	100%	120 hrs	0 days	Mon 10/25/04	Fri 11/12/04
11	Mech. Technician-SiDet	100%	120 hrs	0 days	Mon 10/25/04	Fri 11/12/04
12	Research Associate	100%	120 hrs	0 days	Mon 10/25/04	Fri 11/12/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	$5,082	$0	$0	$5,082
11	Mech. Technician-SiDet	100%	$3,480	$0	$0	$3,480
12	Research Associate	100%	$0	$0	$0	$0

Notes

This represents an additional electrical shield around L0.

1.1.7.2.9 — Inner Detector Complete — $0

1.1.7.3 — Integration — $205,224

Notes

This task incudes the fixtures and labor associated with installing the inner detector (L0) into the outer barrel. All costs and labor are estimated based on Run IIa experience

1.1.7.3.1 — Prototype Inner Detector Installation Fixtures: design — $12,878

ID	Resource Name	Units	Work	Delay	Start	Finish
6	Designer-SiDet	25%	160 hrs	0 days	Mon 8/18/03	Wed 12/10/03
8	Mech. Engineer-SiDet	25%	160 hrs	0 days	Mon 8/18/03	Wed 12/10/03
12	Research Associate	25%	160 hrs	0 days	Mon 8/18/03	Wed 12/10/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	25%	$6,102	$0	$0	$6,102
8	Mech. Engineer-SiDet	25%	$6,776	$0	$0	$6,776

WBS	Name	Cost

"Prototype Inner Detector Installation Fixtures: design" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
12	Research Associate	25%	$0	$0	$0	$0

Notes

These are the fixtures for installing the inner detectors into the outer svxiib barrel.

1.1.7.3.2   Prototype Inner Detector Installation Fixtures: fabrication $30,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Wed 12/10/03	Wed 12/10/03	$20,000	$0	$0	$20,000
3	FNALCont	0%	0 hrs	0 days	Wed 12/10/03	Wed 12/10/03	$10,000	$0	$0	$10,000

Notes

Cost:
Price is based on L00 installation fixtures

1.1.7.3.3   Prototype Inner Detector Installation Fixtures: test $7,761

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	60 hrs	0 days	Thu 3/18/04	Wed 4/28/04
11	Mech. Technician-SiDet	50%	120 hrs	0 days	Thu 3/18/04	Wed 4/28/04
12	Research Associate	50%	120 hrs	0 days	Thu 3/18/04	Wed 4/28/04
13	CMM Programmer-SiDet	25%	60 hrs	0 days	Thu 3/18/04	Wed 4/28/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$2,541	$0	$0	$2,541
11	Mech. Technician-SiDet	50%	$3,480	$0	$0	$3,480
12	Research Associate	50%	$0	$0	$0	$0
13	CMM Programmer-SiDet	25%	$1,740	$0	$0	$1,740

Notes

This test is setup on a CMM and the alignment is tested

1.1.7.3.4   Inner Detector Installation Fixtures: Final Design $33,553

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Designer-SiDet	100%	480 hrs	0 days	Thu 4/29/04	Fri 7/23/04	$18,307	$0	$0	$18,307
8	Mech. Engineer-SiDet	75%	360 hrs	0 days	Thu 4/29/04	Fri 7/23/04	$15,246	$0	$0	$15,246
12	Research Associate	50%	240 hrs	0 days	Thu 4/29/04	Fri 7/23/04	$0	$0	$0	$0

Notes

This covers the redesign/ adjustments to the prototype fixtures

WBS	Name					Cost			
1.1.7.3.5	Inner Detector Installation Fixtures: fabrication					$30,000			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Fri 7/23/04	Fri 7/23/04	$20,000	$0	$0	$20,000
3	FNALCont	0%	0 hrs	0 days	Fri 7/23/04	Fri 7/23/04	$10,000	$0	$0	$10,000

Notes

Cost:
Price is based on L00 installation fixtures

WBS	Name		Cost
1.1.7.3.6	Inner Detector Installation Fixtures: test		$7,761

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	25%	60 hrs	0 days	Tue 10/19/04	Wed 12/1/04
11	Mech. Technician-SiDet	50%	120 hrs	0 days	Tue 10/19/04	Wed 12/1/04
12	Research Associate	50%	120 hrs	0 days	Tue 10/19/04	Wed 12/1/04
13	CMM Programmer-SiDet	25%	60 hrs	0 days	Tue 10/19/04	Wed 12/1/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	25%	$2,541	$0	$0	$2,541
11	Mech. Technician-SiDet	50%	$3,480	$0	$0	$3,480
12	Research Associate	50%	$0	$0	$0	$0
13	CMM Programmer-SiDet	25%	$1,740	$0	$0	$1,740

Notes

Setup on CMM and test alignment

WBS	Name		Cost
1.1.7.3.7	Fabricate beampipe supports		$56,270

ID	Resource Name	Units	Work	Delay	Start	Finish
1	FNALEQ	0%	0 hrs	0 days	Wed 12/1/04	Wed 12/1/04
3	FNALCont	0%	0 hrs	0 days	Wed 12/1/04	Wed 12/1/04
6	Designer-SiDet	50%	160 hrs	0 days	Thu 12/2/04	Fri 2/4/05
8	Mech. Engineer-SiDet	25%	80 hrs	0 days	Thu 12/2/04	Fri 2/4/05
11	Mech. Technician-SiDet	100%	320 hrs	0 days	Thu 12/2/04	Fri 2/4/05
12	Research Associate	50%	160 hrs	0 days	Thu 12/2/04	Fri 2/4/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	$25,000	$0	$0	$25,000
3	FNALCont	0%	$12,500	$0	$0	$12,500
6	Designer-SiDet	50%	$6,102	$0	$0	$6,102
8	Mech. Engineer-SiDet	25%	$3,388	$0	$0	$3,388

WBS	Name	Cost

"Fabricate beampipe supports" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	Mech. Technician-SiDet	100%	$9,280	$0	$0	$9,280
12	Research Associate	50%	$0	$0	$0	$0

Notes

based on Run IIa experience

1.1.7.3.8	Ready to integrate inner and outer detectors	$0

1.1.7.3.9   Combine Inner and Outer Detectors $5,708

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	80 hrs	0 days	Thu 2/24/05	Wed 3/9/05	$3,388	$0	$0	$3,388
11	Mech. Technician-SiDet	100%	80 hrs	0 days	Thu 2/24/05	Wed 3/9/05	$2,320	$0	$0	$2,320
12	Research Associate	100%	80 hrs	0 days	Thu 2/24/05	Wed 3/9/05	$0	$0	$0	$0
15	Scientist	100%	80 hrs	0 days	Thu 2/24/05	Wed 3/9/05	$0	$0	$0	$0

Notes

This assumes the fixtures were already setup and aligned

1.1.7.3.10   Final survey $5,174

ID	Resource Name	Units	Work	Delay	Start	Finish
8	Mech. Engineer-SiDet	100%	40 hrs	0 days	Thu 3/10/05	Wed 3/16/05
11	Mech. Technician-SiDet	200%	80 hrs	0 days	Thu 3/10/05	Wed 3/16/05
12	Research Associate	100%	40 hrs	0 days	Thu 3/10/05	Wed 3/16/05
13	CMM Programmer-SiDet	100%	40 hrs	0 days	Thu 3/10/05	Wed 3/16/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	200%	$2,320	$0	$0	$2,320
12	Research Associate	100%	$0	$0	$0	$0
13	CMM Programmer-SiDet	100%	$1,160	$0	$0	$1,160

Notes

relative alignment of the barrels is determined algon with alignment to external reference system

1.1.7.3.11   Final Cooling and electrical Tests $12,104

ID	Resource Name	Units	Work	Delay	Start	Finish
7	Elect. Engineer	50%	80 hrs	0 days	Thu 3/17/05	Wed 4/13/05
8	Mech. Engineer-SiDet	50%	80 hrs	0 days	Thu 3/17/05	Wed 4/13/05

WBS	Name	Cost

"Final Cooling and electrical Tests" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
11	Mech. Technician-SiDet	100%	160 hrs	0 days	Thu 3/17/05	Wed 4/13/05
12	Research Associate	400%	640 hrs	0 days	Thu 3/17/05	Wed 4/13/05
15	Scientist	100%	160 hrs	0 days	Thu 3/17/05	Wed 4/13/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	$4,076	$0	$0	$4,076
8	Mech. Engineer-SiDet	50%	$3,388	$0	$0	$3,388
11	Mech. Technician-SiDet	100%	$4,640	$0	$0	$4,640
12	Research Associate	400%	$0	$0	$0	$0
15	Scientist	100%	$0	$0	$0	$0

Notes

Large fraction of system will be run

1.1.7.3.12 top of SVX extention cylinders (final dressing, position monitors) $4,014

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	40 hrs	0 days	Thu 4/14/05	Wed 4/20/05	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	200%	80 hrs	0 days	Thu 4/14/05	Wed 4/20/05	$2,320	$0	$0	$2,320
12	Research Associate	100%	40 hrs	0 days	Thu 4/14/05	Wed 4/20/05	$0	$0	$0	$0

Notes

This includes the final dressing of everything, installation of position monitors, beampipe supports, deflection limiters, etc)

1.1.7.3.13	SVX2b Ready for Installation	$0
1.1.8	Transportation and Installation	$52,974
1.1.8.1	Run 2a Ends	$0
1.1.8.2	CDF to Assembly Hall/ Plugs Opened	$0

Notes

Based on runiia experience, it takes 35 days to move CDF from the collision hall to the assembly hall.
Labor:
This labor is traditionally provided by CDF operations

1.1.8.3	SVX2a Extracted and Moved to SiDet	$0

Notes

Labor:
this labor is traditionally provided by CDF operations.

WBS	Name	Cost
1.1.8.4	Install/test JPC	$0

Notes

JPC are installed onto the COT repeater card ring.
Task to be performed in the Assembly Hall.
Schedule:
We have ~40 JPCs and we assume an insallation/testing rate of 1/day.
JPC, inner cables and outer cables installation tasks are performed in parallel by a single crew.
Test is done using an external DAQ/PS unit and a "test wedge" 5 staves unit.
Labor:
is computed into the "Install/test Outer Cables" task.

WBS	Name	Cost
1.1.8.5	Install/test new inner cables	$0

Notes

These are the cables from the JPC to the JC.
Task to be performed in the Assembly Hall.
Schedule:
We have ~40 bundles and assume insallation/testing rate of 1/day.
JPC, inner cables and outer cables installation is performed in parallel.
Test is done using an external DAQ/PS unit and a "test wedge" 5 staves unit.
Labor:
is computed into the "Install/test Outer Cables" task.

WBS	Name	Cost
1.1.8.6	Install/test new Outer Cables	$7,680

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	100%	320 hrs	0 days	Tue 3/1/05	Mon 4/25/05	$7,680	$0	$0	$7,680
12	Research Associate	400%	1,280 hrs	0 days	Tue 3/1/05	Mon 4/25/05	$0	$0	$0	$0

Notes

These are the cables from the JPC to the PS.
Task to be performed in the Assembly Hall.
Schedule:
We have ~40 bundles and assume insallation/testing rate of 1/day.
JPC, inner cables and outer cables installation is performed in parallel.
Test is done using an external DAQ/PS unit and a "test wedge" 5 staves unit.
Labor:
1. Research Associate (400%) they install the cables and perform the testing
2. Elect. Technician (100%) support
Logistic support is provided for by CDF operations.

WBS	Name	Cost
1.1.8.7	install/test new power supplies and FTMs	$7,680

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
9	Elect. Technician	100%	320 hrs	0 days	Tue 2/22/05	Mon 4/18/05	$7,680	$0	$0	$7,680

WBS	Name	Cost

"install/test new power supplies and FTMs" continued

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
12	Research Associate	300%	960 hrs	0 days	Tue 2/22/05	Mon 4/18/05	$0	$0	$0	$0

Notes

Task to be performed in the Collision Hall
Schedule:
This means remove old crates, install new crates, installing and testing new power supplies.
We have ~100 new power supplies to install and ~40 FTMs.
This work can start as soon as there is access to the collision hall and has to finish before CDF is rolled back into the collision hall.
We will use a passive "load box" for the testing of the PS.
Labor:
1. Research Associate (300%) installation and testing
2. Elect. Technician (100%) support

1.1.8.8					Remove SVXII/L00/BP		$5,708			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	80 hrs	0 days	Tue 3/1/05	Mon 3/14/05	$3,388	$0	$0	$3,388
11	Mech. Technician-SiDet	100%	80 hrs	0 days	Tue 3/1/05	Mon 3/14/05	$2,320	$0	$0	$2,320
12	Research Associate	100%	80 hrs	0 days	Tue 3/1/05	Mon 3/14/05	$0	$0	$0	$0

Notes

Task to be performed at SiDet.

1.1.8.9	ISL ready for SVX2b	$0

1.1.8.10					Install & Align SVX2b in ISL		$8,028			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	80 hrs	0 days	Thu 4/21/05	Wed 5/4/05	$3,388	$0	$0	$3,388
11	Mech. Technician-SiDet	200%	160 hrs	0 days	Thu 4/21/05	Wed 5/4/05	$4,640	$0	$0	$4,640
12	Research Associate	100%	80 hrs	0 days	Thu 4/21/05	Wed 5/4/05	$0	$0	$0	$0

Notes

Task to be performed at SiDet.

1.1.8.11					Fasten/Test ISL Junction Cards		$3,480			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
11	Mech. Technician-SiDet	100%	120 hrs	0 days	Thu 5/5/05	Wed 5/25/05	$3,480	$0	$0	$3,480
12	Research Associate	200%	240 hrs	0 days	Thu 5/5/05	Wed 5/25/05	$0	$0	$0	$0

WBS	Name	Cost

"Fasten/Test ISL Junction Cards" continued

Notes
Task to be performed at SiDet.

1.1.8.12 Extension Cylinders Installation and beampipe supports $1,712

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	24 hrs	0 days	Thu 5/26/05	Tue 5/31/05	$1,016	$0	$0	$1,016
11	Mech. Technician-SiDet	100%	24 hrs	0 days	Thu 5/26/05	Tue 5/31/05	$696	$0	$0	$696
12	Research Associate	100%	24 hrs	0 days	Thu 5/26/05	Tue 5/31/05	$0	$0	$0	$0

Notes
Task to be performed at SiDet.

1.1.8.13 Transport SVX2b to B0 & Install in CDF $2,854

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
8	Mech. Engineer-SiDet	100%	40 hrs	0 days	Wed 6/1/05	Tue 6/7/05	$1,694	$0	$0	$1,694
11	Mech. Technician-SiDet	100%	40 hrs	0 days	Wed 6/1/05	Tue 6/7/05	$1,160	$0	$0	$1,160
12	Research Associate	200%	80 hrs	0 days	Wed 6/1/05	Tue 6/7/05	$0	$0	$0	$0
15	Scientist	100%	40 hrs	0 days	Wed 6/1/05	Tue 6/7/05	$0	$0	$0	$0

Notes
Task to be performed in the Assembly Hall.

1.1.8.14 Inner cables connected $0

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
12	Research Associate	200%	80 hrs	0 days	Wed 6/8/05	Tue 6/14/05	$0	$0	$0	$0

Notes
Inner cables are connected to JCs.
This is essentially part of the installation process. NO TESTING is performed at this time.
Labor:
1. Research Associate (200%)

1.1.8.15 Plugs Closed/CDF to Collision Hall $0

Notes
Labor:
This labor is traditionally provided by CDF operations.

WBS	Name	Cost
1.1.8.16	Connect and Test	$15,832

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Elect. Engineer	50%	160 hrs	0 days	Wed 6/22/05	Wed 8/17/05	$8,152	$0	$0	$8,152
9	Elect. Technician	100%	320 hrs	0 days	Wed 6/22/05	Wed 8/17/05	$7,680	$0	$0	$7,680
12	Research Associate	600%	1,920 hrs	0 days	Wed 6/22/05	Wed 8/17/05	$0	$0	$0	$0
15	Scientist	200%	640 hrs	0 days	Wed 6/22/05	Wed 8/17/05	$0	$0	$0	$0

Notes

Cables from the JPC are connected to the PS and rest of the DAQ system.
Then the final system tests.
Tests are aimed at identifying problems and troubleshooting them
Also we should try to identify the best "grounding" configuration for the detector.
We assume we can test a section of the detector corresponding to a JPC per day.
Labor:
Based on IIa experience we calculated 2 crews of 2 post-docs each + 2 post-docs for running the testing programs. All other personnel is for support and help in troubleshooting.

WBS	Name	Cost
1.1.8.17	SVX2b Project Complete	$0
1.1.9	Labor contingency	$250,000

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	FNALCont	0%	0 hrs	0 days	Wed 10/1/03	Wed 10/1/03	$250,000	$0	$0	$250,000

WBS	Name	Cost
1.2	Central Preshower	$945,050.28

Notes

Summary task for the Central Preradiator detector

WBS	Name	Cost
1.2.1	Research and Development	$101,234.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Wed 5/1/02	Wed 5/1/02	$55,672.00	$0.00	$0.00	$55,672.00
4	ItalyEQ	0%	0 hrs	0 mons	Wed 5/1/02	Wed 5/1/02	$18,000.00	$0.00	$0.00	$18,000.00
5	JapanEQ	0%	0 hrs	0 mons	Wed 5/1/02	Wed 5/1/02	$27,562.00	$0.00	$0.00	$27,562.00

Notes

This tasks covers the costs estimated for building a prototype detector module and studying the system.   It is the sum of the ANL and MSU R+D proposals to FNAL, plus the 20 phototubes
purchased by Japan and the 20K euros Italy has proposed for scintillator studies.
The 20 tubes are of two types,   10 of H6568 for $13387 and 10 of H6568mod for
$14175.   These are the final costs including all taxes and discounts.

WBS	Name		Cost
1.2.2	Procure parts		$667,825.00

Notes

Summary task for the procurement of all the parts needed for the detector

1.2.2.1			Phototubes and bases			$414,236.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Sat 2/1/03	Sat 2/1/03	$45,358.00	$0.00	$0.00	$45,358.00
3	FNALCont	0%	0 hrs	0 mons	Sat 2/1/03	Sat 2/1/03	$95,635.00	$0.00	$0.00	$95,635.00
5	JapanEQ	0%	0 hrs	0 days	Sat 2/1/03	Sat 2/1/03	$273,243.00	$0.00	$0.00	$273,243.00

Notes

Hamamatsu quote to Fumi Ukegawa (Univ of Tsukuba) on 2-28-2002, reinforced by an initial purchase for R+D of 20 tubes. Price is for 220 tubes and bases (includes 15% spares) of H6568 16-channel type. Exchange rate assumed was 120 yen/dollar. True price is 149041 yen per tube, including all discounts which change year by year. This gives the estimate of $273243. Then the indirect costs of 16.6% added.

1.2.2.2			Electronics Transition Card			$20,000.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Fri 5/16/03	Fri 5/16/03	$15,000.00	$0.00	$0.00	$15,000.00
3	FNALCont	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03	$5,000.00	$0.00	$0.00	$5,000.00

Notes

Very similar to CDF Plug Shower Max transition cards. Quote from Gary Drake (Argonne engineer).

1.2.2.3			HV Supplies and cables			$75,800.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03	$8,300.00	$0.00	$0.00	$8,300.00
3	FNALCont	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03	$17,500.00	$0.00	$0.00	$17,500.00
4	ItalyEQ	0%	0 hrs	0 days	Fri 5/16/03	Fri 5/16/03	$50,000.00	$0.00	$0.00	$50,000.00

Notes

CAEN SY527 with 10 A932AN cards. Quote to Stefano Lami on 9-01-2001. add another $10K for cables per Stefano's estimate. Indirect cost of 16.6% added.

1.2.2.5	CPR Detector parts		$132,133.00

Notes

Summary task for the parts included in the detector modules.

1.2.2.5.1			Scintillator (JINR)			$75,800.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Mon 2/24/03	Mon 2/24/03	$8,300.00	$0.00	$0.00	$8,300.00
3	FNALCont	0%	0 hrs	0 mons	Mon 2/24/03	Mon 2/24/03	$17,500.00	$0.00	$0.00	$17,500.00

WBS				Name			Cost			

"Scintillator (JINR)" continued

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	ItalyEQ	0%	0 hrs	0 days	Mon 2/24/03	Mon 2/24/03	$50,000.00	$0.00	$0.00	$50,000.00

Notes

Assume we'll use extra MINOS scintillator, which is assumed to be available at no cost.

1.2.2.5.2   Optical Fibers and Connectors $51,083.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Mon 2/24/03	Mon 2/24/03	$5,594.00	$0.00	$0.00	$5,594.00
3	FNALCont	0%	0 hrs	0 mons	Mon 2/24/03	Mon 2/24/03	$11,793.00	$0.00	$0.00	$11,793.00
4	ItalyEQ	0%	0 hrs	0 days	Mon 2/24/03	Mon 2/24/03	$33,696.00	$0.00	$0.00	$33,696.00

Notes

WLS fiber: 54 channels * 1 fibers/channel * 1.5m average * 48 wedges * $2/m = $7776.   Clear fiber: 54 channels * 1 fibers/channel * 5m average * 48 wedges * $2/m = $25920.   Indirect costs of 16.6% added.

1.2.2.5.3   Sheet metal and misc. supplies $5,250.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Mon 4/21/03	Mon 4/21/03	$3,500.00	$0.00	$0.00	$3,500.00
3	FNALCont	0%	0 hrs	0 mons	Mon 4/21/03	Mon 4/21/03	$1,750.00	$0.00	$0.00	$1,750.00

Notes

Estimate from Jim (Argonne): $1000 for sheet metal, $2500 for epoxies and other misc.

1.2.2.6   CCR Detector parts $25,656.00

Notes

Summary task for the parts needed in the Crack Chamber modules.

1.2.2.6.1   Scintillator (JINR) $15,166.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Mon 2/24/03	Mon 2/24/03	$1,666.00	$0.00	$0.00	$1,666.00
3	FNALCont	0%	0 hrs	0 mons	Mon 2/24/03	Mon 2/24/03	$3,500.00	$0.00	$0.00	$3,500.00
4	ItalyEQ	0%	0 hrs	0 mons	Mon 2/24/03	Mon 2/24/03	$10,000.00	$0.00	$0.00	$10,000.00

Notes

Physicist estimate. Indirect costs of 16.6% added.

WBS		Name			Cost			
1.2.2.6.2		Optical Fibers and Connectors			$9,440.00			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	1.95 mons	Thu 4/17/03	Thu 4/17/03	$1,000.00	$0.00	$0.00	$1,000.00
3	FNALCont	0%	0 hrs	2 mons	Fri 4/18/03	Fri 4/18/03	$2,200.00	$0.00	$0.00	$2,200.00
4	ItalyEQ	0%	0 hrs	2 mons	Fri 4/18/03	Fri 4/18/03	$6,240.00	$0.00	$0.00	$6,240.00

Notes

WLS: 10 channels * 1 fiber/channel * 1.5m average * 48 wedges * $2/m = $1440   Clear: 10 channels * 1 fiber/channel * 5m average * 48 wedges * $2/m = $4800.
Indirect cost of 16.6% added.

WBS		Name			Cost			
1.2.2.6.3		Sheet metal and misc. supplies			$1,050.00			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Mon 4/21/03	Mon 4/21/03	$700.00	$0.00	$0.00	$700.00
3	FNALCont	0%	0 hrs	0 mons	Mon 4/21/03	Mon 4/21/03	$350.00	$0.00	$0.00	$350.00

Notes

Physicist estimate.

WBS	Name	Cost
1.2.2.6.4	Scintillator and fiber orders placed	$0.00
1.2.2.7	First phototube order placed	$0.00
1.2.2.8	Final phototubes arrive	$0.00
1.2.3	CPR Detector Assembly	$102,915.28

Notes

Summary task for the assembly of the CPR modules.

WBS	Name	Cost
1.2.3.1	Prepare scintillator tiles	$63,666.00

ID	Resource Name	Units	Work	Delay	Start	Finish
1	FNALEQ	0%	0 hrs	0 days	Fri 5/16/03	Fri 5/16/03
3	FNALCont	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03
6	Mech. Technician II	100%	1,296 hrs	0 mons	Mon 5/19/03	Tue 1/20/04
7	Mech. Technical Specialist	25%	324 hrs	0 mons	Mon 5/19/03	Tue 1/20/04

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	$0.00	$0.00	$0.00	$0.00
3	FNALCont	0%	$21,222.00	$0.00	$0.00	$21,222.00
6	Mech. Technician II	100%	$29,808.00	$0.00	$0.00	$29,808.00
7	Mech. Technical Specialist	25%	$12,636.00	$0.00	$0.00	$12,636.00

WBS	Name	Cost

"Prepare scintillator tiles" continued

Notes

Estimate 1 tile every 30 minutes, 2 per hour, 16 per day.
We need 54*48 for CPR= 2592.   2592/16 = 162 days of labor.
Give this 50% contingency.

1.2.3.3 — Assemble bottom of module — $5,607.04

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Fri 5/16/03	Fri 5/16/03	$4,307.04	$0.00	$0.00	$4,307.04
3	FNALCont	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03	$1,300.00	$0.00	$0.00	$1,300.00

Notes

Jim(Argonne): 1.5 hr * 48 * $59.82/hr

1.2.3.4 — Installing fibers into tiles — $18,656.80

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Mon 6/16/03	Mon 6/16/03	$14,356.80	$0.00	$0.00	$14,356.80
3	FNALCont	0%	0 hrs	0 mons	Mon 6/16/03	Mon 6/16/03	$4,300.00	$0.00	$0.00	$4,300.00

Notes

Jim(Argonne) estimate for Minos-type detector: 10 hrs * 48 * 59.82/hr = $28713.60.
For a Dubna-type detector we assume x3 less fibers but a more complicated
fiber pattern.   Assume overall x2 less labor for a Dubna-type detector, therefore
$14356.80.

1.2.3.7 — Assemble module top — $7,492.72

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 7/15/03	Tue 7/15/03	$5,742.72	$0.00	$0.00	$5,742.72
3	FNALCont	0%	0 hrs	0 mons	Tue 7/15/03	Tue 7/15/03	$1,750.00	$0.00	$0.00	$1,750.00

Notes

Jim(Argonne): 2hr * 48 * 59.82/hr

1.2.3.8 — Quality control — $7,492.72

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Mon 6/16/03	Mon 6/16/03	$5,742.72	$0.00	$0.00	$5,742.72
3	FNALCont	0%	0 hrs	0 mons	Mon 6/16/03	Mon 6/16/03	$1,750.00	$0.00	$0.00	$1,750.00

Notes

Jim(Argonne): 2 hr * 48 * 59.82/hr

1.2.3.9 — Module testing — $0.00

WBS	Name	Cost
1.2.3.10	1st module finished and tested	$0.00
1.2.4	CCR Detector Assembly	$19,076.00

Notes

Summary task for the construction of the Central Crack chamber modules.

1.2.4.1	Prepare scintillator tiles	$12,576.00

ID	Resource Name	Units	Work	Delay	Start	Finish
3	FNALCont	0%	0 hrs	0 mons	Tue 8/12/03	Tue 8/12/03
4	ItalyEQ	0%	0 hrs	0 mons	Tue 8/12/03	Tue 8/12/03
6	Mech. Technician II	100%	256 hrs	0 mons	Wed 8/13/03	Fri 9/26/03
7	Mech. Technical Specialist	25%	64 hrs	0 mons	Wed 8/13/03	Fri 9/26/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	FNALCont	0%	$4,192.00	$0.00	$0.00	$4,192.00
4	ItalyEQ	0%	$0.00	$0.00	$0.00	$0.00
6	Mech. Technician II	100%	$5,888.00	$0.00	$0.00	$5,888.00
7	Mech. Technical Specialist	25%	$2,496.00	$0.00	$0.00	$2,496.00

Notes

CCR has 20% of CPR channels.   Assume 20% of CPR labor.
Give it 50% contingency.

1.2.4.2	Assemble detector with CPR procedure	$6,500.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Wed 9/10/03	Wed 9/10/03	$5,000.00	$0.00	$0.00	$5,000.00
3	FNALCont	0%	0 hrs	0 mons	Wed 9/10/03	Wed 9/10/03	$1,500.00	$0.00	$0.00	$1,500.00

Notes

Physicist estimate

1.2.4.3	1st module finished and tested	$0.00
1.2.5	Fiber Bundles	$54,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Mon 5/19/03	Fri 5/7/04	$0.00	$0.00	$0.00	$0.00
3	FNALCont	0%	0 hrs	0 mons	Mon 5/19/03	Fri 5/7/04	$0.00	$0.00	$0.00	$0.00

Notes

Physicist estimate.

WBS				Name			Cost			

1.2.5.1 — Design of phototube fixtures and clear fibers — $13,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03	$10,000.00	$0.00	$0.00	$10,000.00
3	FNALCont	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03	$3,000.00	$0.00	$0.00	$3,000.00

1.2.5.4 — Assemble clear fiber bundles — $13,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Wed 11/5/03	Wed 11/5/03	$10,000.00	$0.00	$0.00	$10,000.00
3	FNALCont	0%	0 hrs	0 mons	Wed 11/5/03	Wed 11/5/03	$3,000.00	$0.00	$0.00	$3,000.00

1.2.5.5 — Assemble WLS fiber pigtails — $13,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03	$10,000.00	$0.00	$0.00	$10,000.00
3	FNALCont	0%	0 hrs	0 mons	Fri 5/16/03	Fri 5/16/03	$3,000.00	$0.00	$0.00	$3,000.00

1.2.5.6 — Assemble phototube fixtures — $15,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 mons	Wed 11/5/03	Wed 11/5/03	$10,000.00	$0.00	$0.00	$10,000.00
3	FNALCont	0%	0 hrs	0 mons	Wed 11/5/03	Wed 11/5/03	$5,000.00	$0.00	$0.00	$5,000.00

Notes

Physicist guess at this point.

1.2.5.7 — 1st WLS fiber bundle finished — $0.00

1.3 — Run IIb Data Acquisition project — $1,199,907.20

Notes

Data Aquisition project is mostly the upgrade of the level3 and event builder systems plus some minor upgrade in the computing related.

1.3.1 — Even\t-Builder Upgrade — $557,411.20

Notes

The Event Builder upgrade is based on the same technology as the first one except for increased bandwidth. This path has been chosen since the increase in throughput and rate a mild and using the same technology minimizes the effort needed for the upgrade.

The details of the purchase and all parts are assumed to be equal to the purchase of the present Event Builder hardware. According to somewhat outdated quotes the hardware costs about 500k.

Contingency is included in the sense that these are old quotes and the hardware will only become cheaper, although not by much.

Further Details on the Hardware from a quote from December 2001

WBS	Name	Cost

"Even\t-Builder Upgrade" continued

Notes

Raw cost
32 port ASX 4000 (Marconi)	$215k
16 OC12 PCI cards (ForeRunnerHE 622)	$30k
15 OC-12 PMC carss (Cyclonwe PMC59)	$60k
Total	$305k
Spares	
1 Spare switch backbone	$51k
1 Spare switch module	$40k
3 Spare PCI cards	$6k
3 Spare ATM cards	$12k
Total	$109k
Total including spares	$414k
Including 30% contingency	$538k

1.3.1.1 upgrade software $7,280.00

Notes

One postdoc/researcher type is needed 100% of the time to work on this project. Probably a second person will split the work with this person and both work 50% of their time.

1.3.1.1.1 decide on the OS versions $1,040.00

ID	Resource Name	Units	Work	Delay	Start	Finish
5	Research Associate	50%	40 hrs	0 days	Tue 11/25/03	Wed 12/10/03

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	50%	$1,040.00	$0.00	$0.00	$1,040.00

1.3.1.1.2 test available drivers for compatibility with hardware $624.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	24 hrs	0 days	Thu 12/11/03	Wed 1/14/04	$624.00	$0.00	$0.00	$624.00
7	Students	100%	120 hrs	0 days	Thu 12/11/03	Wed 1/14/04	$0.00	$0.00	$0.00	$0.00

1.3.1.1.3 adjust drivers for special needs $5,408.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	208 hrs	0 days	Thu 1/15/04	Fri 7/16/04	$5,408.00	$0.00	$0.00	$5,408.00
7	Students	100%	1,040 hrs	0 days	Thu 1/15/04	Fri 7/16/04	$0.00	$0.00	$0.00	$0.00

WBS		Name					Cost			

1.3.1.1.4 — adjust remaining software — $208.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	8 hrs	0 days	Mon 7/19/04	Fri 7/23/04	$208.00	$0.00	$0.00	$208.00
7	Students	100%	40 hrs	0 days	Mon 7/19/04	Fri 7/23/04	$0.00	$0.00	$0.00	$0.00

1.3.1.1.5 — MS: establish general functionality of software — $0.00

1.3.1.2 — renew infrastructure — $6,806.40

Notes

Two students are needed 50% of their time to disassemel the system. A electrician is needed in case the AC needs to be upgraded (bring this up in the meeting).

1.3.1.2.1 — establish cooling plan, 3rd floor — $2,912.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
6	Scientist I	100%	56 hrs	0 days	Mon 1/19/04	Tue 1/27/04	$2,912.00	$0.00	$0.00	$2,912.00

1.3.1.2.2 — interlocks are broken — $0.00

1.3.1.2.3 — disassemble old system, 3rd floor — $166.40

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	6.4 hrs	0 days	Tue 1/4/05	Fri 1/7/05	$166.40	$0.00	$0.00	$166.40
7	Students	100%	32 hrs	0 days	Tue 1/4/05	Fri 1/7/05	$0.00	$0.00	$0.00	$0.00

1.3.1.2.4 — shutdown system to prepare AC work, 3rd floor — $83.20

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	3.2 hrs	0 days	Mon 1/10/05	Tue 1/11/05	$83.20	$0.00	$0.00	$83.20
7	Students	100%	16 hrs	0 days	Mon 1/10/05	Tue 1/11/05	$0.00	$0.00	$0.00	$0.00

1.3.1.2.5 — upgrade AC, 3rd floor — $3,520.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Elect. Technician I	100%	160 hrs	0 days	Wed 1/12/05	Tue 2/8/05	$3,520.00	$0.00	$0.00	$3,520.00

1.3.1.2.6 — reassemble 3rd floor — $124.80

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	4.8 hrs	0 days	Wed 2/9/05	Fri 2/11/05	$124.80	$0.00	$0.00	$124.80
7	Students	100%	24 hrs	0 days	Wed 2/9/05	Fri 2/11/05	$0.00	$0.00	$0.00	$0.00

1.3.1.2.7 — infrastructure ready, 3rd floor — $0.00

WBS	Name	Cost
1.3.1.3	construct prototype	$134,916.00

Notes

Installation and commissioning of the prototype system will be done by two students using 50% of their time supervised by a postdoc/researcher type.

WBS	Name	Cost
1.3.1.3.1	purchase prototype system (1/4)	$134,500.00
1.3.1.3.1.1	submit PO and implementation plan	$134,500.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	100%	0 hrs	0 days	Mon 2/9/04	Mon 2/9/04	$103,500.00	$0.00	$0.00	$103,500.00
2	FNALCont	100%	0 hrs	0 days	Mon 2/9/04	Mon 2/9/04	$31,000.00	$0.00	$0.00	$31,000.00

Notes

The details of the purchase and all parts are assumed to be equal to the purchase of the present Event Builder hardware. According to somewhat outdated quotes the hardware costs about 500k. The prototype system constsist of about one fourth of that (125k).

Contingency is included in the sense that these are old quotes and the hardware will only become cheaper, although not by much.

WBS	Name	Cost
1.3.1.3.1.2	purchase formalities	$0.00
1.3.1.3.1.3	arrival of the hardware	$0.00
1.3.1.3.2	install test stand	$69.33

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	2.67 hrs	0 days	Tue 5/4/04	Wed 5/5/04	$69.33	$0.00	$0.00	$69.33
7	Students	100%	13.33 hrs	0 days	Tue 5/4/04	Wed 5/5/04	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.3.1.3.3	test test stand	$346.67

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	13.33 hrs	0 days	Wed 5/5/04	Mon 5/17/04	$346.67	$0.00	$0.00	$346.67
7	Students	100%	66.67 hrs	0 days	Wed 5/5/04	Mon 5/17/04	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.3.1.3.4	MS: establish functionality of hardware	$0.00
1.3.1.4	construct full size system	$404,332.00

Notes

Similar to the construction of the prototype two students with 50% of their time supervised by a postdoc/researcher type.

WBS	Name	Cost
1.3.1.4.1	purchase remaining hardware	$403,500.00

WBS	Name	Cost
1.3.1.4.1.1	submit PO and implementation plan	$403,500.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	100%	0 hrs	0 days	Mon 5/17/04	Mon 5/17/04	$310,500.00	$0.00	$0.00	$310,500.00
2	FNALCont	100%	0 hrs	0 days	Mon 5/17/04	Mon 5/17/04	$93,000.00	$0.00	$0.00	$93,000.00

WBS	Name	Cost
1.3.1.4.1.2	purchase formalities	$0.00
1.3.1.4.1.3	arrival of the hardware	$0.00
1.3.1.4.2	install new hardware in B0 third floor	$416.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	16 hrs	0 days	Mon 1/10/05	Fri 1/21/05	$416.00	$0.00	$0.00	$416.00
7	Students	100%	80 hrs	0 days	Mon 1/10/05	Fri 1/21/05	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.3.1.4.3	test the new hardware	$416.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	16 hrs	0 days	Mon 1/24/05	Fri 2/4/05	$416.00	$0.00	$0.00	$416.00
7	Students	100%	80 hrs	0 days	Mon 1/24/05	Fri 2/4/05	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.3.1.4.4	MS: establish functionality of hardware	$0.00
1.3.1.5	commission the system	$4,076.80

Notes

System commissioning is an intense task and has constraints with other systems. The two students and the postdoc/researcher type have to work 100% of their time to commission the system.

WBS	Name	Cost
1.3.1.5.1	DAQ re-established	$0.00
1.3.1.5.2	establish general data flow (simulated and real data)	$416.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	16 hrs	0 days	Mon 2/14/05	Fri 2/25/05	$416.00	$0.00	$0.00	$416.00
7	Students	100%	80 hrs	0 days	Mon 2/14/05	Fri 2/25/05	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.3.1.5.3	ance and optimize data flow software (simulated and real data)	$3,660.80

ID	Resource Name	Units	Work	Delay	Start	Finish
5	Research Associate	20%	140.8 hrs	0 days	Mon 2/28/05	Thu 6/30/05
7	Students	100%	704 hrs	0 days	Mon 2/28/05	Thu 6/30/05

WBS	Name	Cost

"test perfomance and optimize data flow software (simulated and real data)" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	$3,660.80	$0.00	$0.00	$3,660.80
7	Students	100%	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.3.1.5.4	: establish system with design performance using simulated data	$0.00
1.3.1.5.5	MS: establish system with design performance using real data	$0.00
1.3.2	Computer for Level3 PC Farm / DAQ	$642,496.00

Notes

Computer purchase is part of the operations but the cost is listed here for convenient tracking.
We work with the assumption that every three years PCs become obsolete and have to be replaced.

The assumption is that a computer costs about $1500. This number is probably going to be smaller since in the last years the computers have only gotten cheaper. Some farms group have bought computers recently for this price.

It is not useful to get a more detailed quote at this point since the prices are going to vary.

In terms of the human resources this project is rather light weight. The preparation work on the prototype takes 50% of the postdoc/researcher type plus 50% of one student. It takes two students 50% of their time supervised by a postdoc/researcher type to complete the installation and commissioning.

WBS	Name	Cost
1.3.2.1	replace 70/15 PCs (2002)	$160,624.00
1.3.2.1.1	submit PO and implementation plan	$160,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALCont	100%	0 hrs	0 days	Mon 7/1/02	Mon 7/1/02	$30,000.00	$0.00	$0.00	$30,000.00
3	FNALOP	100%	0 hrs	0 days	Mon 7/1/02	Mon 7/1/02	$130,000.00	$0.00	$0.00	$130,000.00

WBS	Name	Cost
1.3.2.1.2	purchase formalities	$0.00
1.3.2.1.3	install and test one prototype machine	$416.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	16 hrs	0 days	Mon 9/23/02	Fri 10/4/02	$416.00	$0.00	$0.00	$416.00
7	Students	100%	80 hrs	0 days	Mon 9/23/02	Fri 10/4/02	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.3.2.1.4	arrival of 70/15 PCs from the vendor	$0.00
1.3.2.1.5	burn in phase	$0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Students	50%	40 hrs	0 days	Fri 10/18/02	Thu 10/31/02	$0.00	$0.00	$0.00	$0.00

Basis of Estimate as of Mon 4/15/02
RunIIbTotal

WBS		Name					Cost			

1.3.2.1.6 — installation into the level3 PC farm — $208.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	8 hrs	0 days	Fri 11/1/02	Thu 11/7/02	$208.00	$0.00	$0.00	$208.00
7	Students	100%	40 hrs	0 days	Fri 11/1/02	Thu 11/7/02	$0.00	$0.00	$0.00	$0.00

1.3.2.2 — replace 70/15 PCs (2003) — $160,624.00

1.3.2.2.1 — submit PO and implementation plan — $160,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALCont	100%	0 hrs	0 days	Tue 7/1/03	Tue 7/1/03	$30,000.00	$0.00	$0.00	$30,000.00
3	FNALOP	100%	0 hrs	0 days	Tue 7/1/03	Tue 7/1/03	$130,000.00	$0.00	$0.00	$130,000.00

1.3.2.2.2 — purchase formalities — $0.00

1.3.2.2.3 — install and test one prototype machine — $416.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	16 hrs	0 days	Tue 9/23/03	Mon 10/6/03	$416.00	$0.00	$0.00	$416.00
7	Students	100%	80 hrs	0 days	Tue 9/23/03	Mon 10/6/03	$0.00	$0.00	$0.00	$0.00

1.3.2.2.4 — arrival of 70/15 PCs from the vendor — $0.00

1.3.2.2.5 — burn in phase — $0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Students	50%	40 hrs	0 days	Fri 10/17/03	Thu 10/30/03	$0.00	$0.00	$0.00	$0.00

1.3.2.2.6 — installation into the level3 PC farm — $208.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	8 hrs	0 days	Fri 10/31/03	Thu 11/6/03	$208.00	$0.00	$0.00	$208.00
7	Students	100%	40 hrs	0 days	Fri 10/31/03	Thu 11/6/03	$0.00	$0.00	$0.00	$0.00

1.3.2.3 — replace 70/15 PCs (2004) — $160,624.00

1.3.2.3.1 — submit PO and implementation plan — $160,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALCont	100%	0 hrs	0 days	Thu 7/1/04	Thu 7/1/04	$30,000.00	$0.00	$0.00	$30,000.00
3	FNALOP	100%	0 hrs	0 days	Thu 7/1/04	Thu 7/1/04	$130,000.00	$0.00	$0.00	$130,000.00

1.3.2.3.2 — purchase formalities — $0.00

WBS		Name					Cost			

1.3.2.3.3   install and test one prototype machine $416.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	16 hrs	0 days	Thu 9/23/04	Wed 10/6/04	$416.00	$0.00	$0.00	$416.00
7	Students	100%	80 hrs	0 days	Thu 9/23/04	Wed 10/6/04	$0.00	$0.00	$0.00	$0.00

1.3.2.3.4   arrival of 70/15 PCs from the vendor $0.00

1.3.2.3.5   burn in phase $0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Students	50%	40 hrs	0 days	Mon 10/18/04	Fri 10/29/04	$0.00	$0.00	$0.00	$0.00

1.3.2.3.6   installation into the level3 PC farm $208.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	8 hrs	0 days	Mon 11/1/04	Fri 11/5/04	$208.00	$0.00	$0.00	$208.00
7	Students	100%	40 hrs	0 days	Mon 11/1/04	Fri 11/5/04	$0.00	$0.00	$0.00	$0.00

1.3.2.4   replace 70/15 PCs (2005) $160,624.00

1.3.2.4.1   submit PO and implementation plan $160,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALCont	100%	0 hrs	0 days	Fri 7/1/05	Fri 7/1/05	$30,000.00	$0.00	$0.00	$30,000.00
3	FNALOP	100%	0 hrs	0 days	Fri 7/1/05	Fri 7/1/05	$130,000.00	$0.00	$0.00	$130,000.00

1.3.2.4.2   purchase formalities $0.00

1.3.2.4.3   install and test one prototype machine $416.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	16 hrs	0 days	Fri 9/23/05	Thu 10/6/05	$416.00	$0.00	$0.00	$416.00
7	Students	100%	80 hrs	0 days	Fri 9/23/05	Thu 10/6/05	$0.00	$0.00	$0.00	$0.00

1.3.2.4.4   arrival of 70/15 PCs from the vendor $0.00

1.3.2.4.5   burn in phase $0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
7	Students	50%	40 hrs	0 days	Mon 10/17/05	Fri 10/28/05	$0.00	$0.00	$0.00	$0.00

1.3.2.4.6   installation into the level3 PC farm $208.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
5	Research Associate	20%	8 hrs	0 days	Mon 10/31/05	Fri 11/4/05	$208.00	$0.00	$0.00	$208.00

WBS		Name					Cost			

"installation into the level3 PC farm" continued

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	7	Students	100%	40 hrs	0 days	Mon 10/31/05	Fri 11/4/05	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.4	Calorimeter upgrades	$204,480.00
1.4.1	Electromagnetic timing	$204,480.00
1.4.1.1	Research and Development	$0.00
1.4.1.1.1	Prototype Test Stand	$0.00
1.4.1.1.1.1	TDC Board	$0.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	3	Texas A&MEQ	10%	48 hrs	0 days	Mon 4/15/02	Fri 7/5/02	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.4.1.1.1.2	ASD Board	$0.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	3	Texas A&MEQ	10%	48 hrs	0 days	Mon 4/15/02	Fri 7/5/02	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.4.1.1.1.4	PMT with modified base	$0.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	4	Texas A&MRD	20%	96 hrs	0 days	Mon 4/15/02	Fri 7/5/02	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.4.1.1.9	Test ASD->TDC Cables	$0.00

Notes

Test cables if they can carry a signal to TDC before ordering

WBS	Name	Cost
1.4.1.1.9.1	Test 2 Prototypes	$0.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	4	Texas A&MRD	50%	40 hrs	0 days	Mon 7/8/02	Fri 7/19/02	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.4.1.1.9.3	Test CEM Cables	$0.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	4	Texas A&MRD	100%	320 hrs	0 days	Mon 9/30/02	Fri 11/22/02	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.4.1.1.9.4	Test PEM Cables	$0.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	4	Texas A&MRD	100%	320 hrs	0 days	Mon 9/30/02	Fri 11/22/02	$0.00	$0.00	$0.00	$0.00

WBS		Name	Cost					
1.4.1.1.10		Test ASD System	$0.00					
1.4.1.1.10.1		Test 1st ASD Batch	$0.00					

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Texas A&MRD	100%	320 hrs	0 days	Mon 3/3/03	Fri 4/25/03	$0.00	$0.00	$0.00	$0.00

Notes
Test 10 Boards

1.4.1.1.10.2	Test 2nd ASD Batch	$0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Texas A&MRD	100%	320 hrs	0 days	Mon 4/28/03	Fri 6/20/03	$0.00	$0.00	$0.00	$0.00

Notes
20 Boards are at FermiLab

1.4.1.1.10.3	Test 3rd ASD Batch	$0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Texas A&MRD	100%	320 hrs	0 days	Mon 6/23/03	Fri 8/15/03	$0.00	$0.00	$0.00	$0.00

Notes
30 Boards are at Fermi Lab

1.4.1.1.10.4	Test 4th ASD Batch	$0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Texas A&MRD	100%	320 hrs	0 days	Mon 8/18/03	Fri 10/10/03	$0.00	$0.00	$0.00	$0.00

Notes
Tested all 40 Boards

1.4.1.1.12	Test TDC Boards	$0.00
1.4.1.1.12.1	Test CEM TDC Boards	$0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Texas A&MRD	100%	160 hrs	0 days	Tue 6/17/03	Mon 7/14/03	$0.00	$0.00	$0.00	$0.00

1.4.1.1.12.5	Test PEM TDC Boards	$0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Texas A&MRD	100%	160 hrs	0 days	Tue 7/15/03	Mon 8/11/03	$0.00	$0.00	$0.00	$0.00

WBS		Name				Cost			
1.4.1.2			Procure parts			$204,480.00			
1.4.1.2.1			Miscellaneous			$29,744.00			
1.4.1.2.1.5			M Lemo Connectors for CEM			$12,102.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$12,102.00	$0.00	$0.00	$12,102.00
1.4.1.2.1.6			M Lemo Connectors for PEM			$6,051.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$6,051.00	$0.00	$0.00	$6,051.00
1.4.1.2.1.7			F Lemo Connectors for CEM			$6,051.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$6,051.00	$0.00	$0.00	$6,051.00
1.4.1.2.1.9			AMP Connector Parts for PEM			$5,540.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 4/15/02	Mon 4/15/02	$5,540.00	$0.00	$0.00	$5,540.00
1.4.1.2.2			Cables			$22,536.00			
1.4.1.2.2.3			CEM ASD to TDC			$13,856.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Fri 7/19/02	Fri 7/19/02	$13,856.00	$0.00	$0.00	$13,856.00
1.4.1.2.2.4			PEM ASD to TDC			$8,680.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Fri 7/19/02	Fri 7/19/02	$8,680.00	$0.00	$0.00	$8,680.00
1.4.1.2.3			Electronics			$152,200.00			
1.4.1.2.3.13			Build CEM+PEM ASD Boards			$60,000.00			
1.4.1.2.3.13.3			2nd Batch			$15,000.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	ItalyEQ	0%	0 hrs	0 days	Fri 2/28/03	Fri 2/28/03	$15,000.00	$0.00	$0.00	$15,000.00

Notes

20 Boards are at FermiLab

WBS		Name					Cost			
1.4.1.2.3.13.4				3rd Batch			$15,000.00			
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	ItalyEQ	0%	0 hrs	0 days	Fri 4/11/03	Fri 4/11/03	$15,000.00	$0.00	$0.00	$15,000.00

Notes
30 Boards are at Fermi Lab

1.4.1.2.3.13.5				1st Batch			$15,000.00			
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	ItalyEQ	0%	0 hrs	0 days	Fri 1/17/03	Fri 1/17/03	$15,000.00	$0.00	$0.00	$15,000.00

Notes
First 10 Boards are at FermiLab

1.4.1.2.3.13.6				4th Batch			$15,000.00			
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	ItalyEQ	0%	0 hrs	0 days	Fri 5/23/03	Fri 5/23/03	$15,000.00	$0.00	$0.00	$15,000.00

Notes
All 40 Boards are at FermiLab

1.4.1.2.3.18		Build CEM+PEM Transition Boards					$19,600.00			
.4.1.2.3.18.12				1st Batch			$4,900.00			
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	ItalyEQ	0%	0 hrs	0 days	Fri 1/17/03	Fri 1/17/03	$4,900.00	$0.00	$0.00	$4,900.00

Notes
First 10 Boards are at FermiLab

.4.1.2.3.18.13				2nd Batch			$4,900.00			
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	ItalyEQ	0%	0 hrs	0 days	Fri 2/28/03	Fri 2/28/03	$4,900.00	$0.00	$0.00	$4,900.00

Notes
20 Boards are at FermiLab

.4.1.2.3.18.14				3rd Batch			$4,900.00			
	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	ItalyEQ	0%	0 hrs	0 days	Fri 4/11/03	Fri 4/11/03	$4,900.00	$0.00	$0.00	$4,900.00

WBS	Name	Cost

"3rd Batch" continued

Notes
30 Boards are at Fermi Lab

.4.1.2.3.18.15 — 4th Batch — $4,900.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	ItalyEQ	0%	0 hrs	0 days	Fri 5/23/03	Fri 5/23/03	$4,900.00	$0.00	$0.00	$4,900.00

Notes
All 40 Boards are at FermiLab

1.4.1.2.3.27 — VME Crate - first floor — $15,000.00

1.4.1.2.3.27.1 — Crate — $5,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 4/19/04	Mon 4/19/04	$5,000.00	$0.00	$0.00	$5,000.00

1.4.1.2.3.27.2 — Processor — $2,500.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 4/19/04	Mon 4/19/04	$2,500.00	$0.00	$0.00	$2,500.00

1.4.1.2.3.27.3 — Tracer — $5,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 4/19/04	Mon 4/19/04	$5,000.00	$0.00	$0.00	$5,000.00

1.4.1.2.3.27.4 — Power Supply — $2,500.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 4/19/04	Mon 4/19/04	$2,500.00	$0.00	$0.00	$2,500.00

1.4.1.2.3.33 — TDC Boards — $57,600.00

1.4.1.2.3.33.1 — CEM TDC Boards — $33,600.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 5/19/03	Mon 5/19/03	$33,600.00	$0.00	$0.00	$33,600.00

1.4.1.2.3.33.2 — PEM TDC Boards — $24,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Texas A&MEQ	0%	0 hrs	0 days	Mon 5/19/03	Mon 5/19/03	$24,000.00	$0.00	$0.00	$24,000.00

WBS	Name	Cost
1.4.1.11	PAC Approval	$0.00
1.4.1.20	Italian Government Approval	$0.00

Notes

Project has to be approved by Italian Government

WBS	Name	Cost
1.8	Installation of Run IIb	$555,437.00
1.8.1	Roll Out From Run 2A	$44,205.60
1.8.1.1	Preparations for Roll Out	$14,714.80
1.8.1.1.1	End of Run 2A -- Drop Interlocks	$0.00
1.8.1.1.2	Open up all muon shielding	$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Wed 4/13/05	Wed 4/13/05
4	Mech. Technician II	400%	32 hrs	0 days	Wed 4/13/05	Wed 4/13/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Wed 4/13/05	Wed 4/13/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

WBS	Name	Cost
1.8.1.1.3	Remove polyethelene bags	$368.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	16 hrs	0 days	Wed 4/13/05	Wed 4/13/05
5	Mech. Technical Specialist	50%	0 hrs	0 days	Wed 4/13/05	Wed 4/13/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$368.00	$0.00	$0.00	$368.00
5	Mech. Technical Specialist	50%	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.8.1.1.4	Turn off flammable gas and begin nitrogen purge	$1,048.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	32 hrs	0 days	Wed 4/13/05	Thu 4/14/05
5	Mech. Technical Specialist	50%	8 hrs	0 days	Wed 4/13/05	Thu 4/14/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	50%	$312.00	$0.00	$0.00	$312.00

WBS	Name	Cost
1.8.1.1.5	Warm up Solenoid	$6,008.00

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	80 hrs	0 days	Wed 4/13/05	Tue 4/26/05
4	Mech. Technician II	100%	80 hrs	0 days	Wed 4/13/05	Tue 4/26/05
5	Mech. Technical Specialist	100%	20 hrs	0 days	Wed 4/13/05	Fri 4/15/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$3,388.00	$0.00	$0.00	$3,388.00
4	Mech. Technician II	100%	$1,840.00	$0.00	$0.00	$1,840.00
5	Mech. Technical Specialist	100%	$780.00	$0.00	$0.00	$780.00

WBS	Name	Cost
1.8.1.1.6	Warm up Silicon	$1,048.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	32 hrs	0 days	Wed 4/13/05	Thu 4/14/05
5	Mech. Technical Specialist	50%	8 hrs	0 days	Wed 4/13/05	Thu 4/14/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	50%	$312.00	$0.00	$0.00	$312.00

WBS	Name	Cost
1.8.1.1.7	Disconnect silicon DAQ cables	$1,840.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	80 hrs	0 days	Wed 4/13/05	Fri 4/15/05	$1,840.00	$0.00	$0.00	$1,840.00

Notes

2 people 2 days/rack 8 racks or 16 2 people crew days
2 days to prep work, install bracketry for cables to hang and ride along on the detector

WBS	Name	Cost
1.8.1.1.8	Drain and disconnect Silicon Cooling lines	$524.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	16 hrs	0 days	Fri 4/15/05	Fri 4/15/05
5	Mech. Technical Specialist	50%	4 hrs	0 days	Fri 4/15/05	Fri 4/15/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$368.00	$0.00	$0.00	$368.00
5	Mech. Technical Specialist	50%	$156.00	$0.00	$0.00	$156.00

WBS	Name					Cost
1.8.1.1.9		Disconnect cryo pipes				$524.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	16 hrs	0 days	Wed 4/27/05	Wed 4/27/05
5	Mech. Technical Specialist	50%	4 hrs	0 days	Wed 4/27/05	Wed 4/27/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$368.00	$0.00	$0.00	$368.00
5	Mech. Technical Specialist	50%	$156.00	$0.00	$0.00	$156.00

WBS	Name					Cost
1.8.1.1.10		Disconnect argon ethane				$524.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	16 hrs	0 days	Thu 4/28/05	Thu 4/28/05
5	Mech. Technical Specialist	50%	4 hrs	0 days	Thu 4/28/05	Thu 4/28/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$368.00	$0.00	$0.00	$368.00
5	Mech. Technical Specialist	50%	$156.00	$0.00	$0.00	$156.00

WBS	Name	Cost
1.8.1.1.11	Resurvey detector and low beta quad magnets	$0.00

WBS	Name					Cost
1.8.1.1.12		Disconnect water, SUVA				$524.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	16 hrs	0 days	Fri 4/29/05	Fri 4/29/05
5	Mech. Technical Specialist	50%	4 hrs	0 days	Fri 4/29/05	Fri 4/29/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$368.00	$0.00	$0.00	$368.00
5	Mech. Technical Specialist	50%	$156.00	$0.00	$0.00	$156.00

WBS	Name	Cost
1.8.1.1.13	Disconnect AC power	$184.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	100%	8 hrs	0 days	Mon 5/2/05	Mon 5/2/05	$184.00	$0.00	$0.00	$184.00

WBS	Name	Cost
1.8.1.1.14	Disconnect Misc cables	$736.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	32 hrs	0 days	Tue 5/3/05	Wed 5/4/05	$736.00	$0.00	$0.00	$736.00

Notes

cables include clock, muon chambers in keystone, muon chambers in north porch, muon and central detector grounding straps, camera in upper notch, TOF clock, miniplug clock, etc

WBS	Name	Cost
1.8.1.2	Roll out Process	$29,490.80

1.8.1.2.1 — Remove 30 degree miniskirts — $2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Thu 4/14/05	Fri 4/15/05
4	Mech. Technician II	400%	64 hrs	0 days	Thu 4/14/05	Fri 4/15/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Thu 4/14/05	Fri 4/15/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.1.2.2 — Open Endplugs — $2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Mon 4/18/05	Tue 4/19/05
4	Mech. Technician II	400%	64 hrs	0 days	Mon 4/18/05	Tue 4/19/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Mon 4/18/05	Tue 4/19/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.1.2.3 — Break Tevatron connections — $1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Wed 4/20/05	Wed 4/20/05
4	Mech. Technician II	400%	32 hrs	0 days	Wed 4/20/05	Wed 4/20/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Wed 4/20/05	Wed 4/20/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.1.2.4 — Remove mini plugs — $2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Thu 4/21/05	Fri 4/22/05
4	Mech. Technician II	400%	64 hrs	0 days	Thu 4/21/05	Fri 4/22/05

WBS	Name	Cost

"Remove mini plugs" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
5	Mech. Technical Specialist	100%	16 hrs	0 days	Thu 4/21/05	Fri 4/22/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.1.2.5   Close Plugs $1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Mon 4/25/05	Mon 4/25/05
4	Mech. Technician II	400%	32 hrs	0 days	Mon 4/25/05	Mon 4/25/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Mon 4/25/05	Mon 4/25/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.1.2.6   Remove plug rails $1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Tue 4/26/05	Tue 4/26/05
4	Mech. Technician II	400%	32 hrs	0 days	Tue 4/26/05	Tue 4/26/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Tue 4/26/05	Tue 4/26/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.1.2.7   Disconnect North CMP wall from 1200 door $1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Wed 4/27/05	Wed 4/27/05
4	Mech. Technician II	400%	32 hrs	0 days	Wed 4/27/05	Wed 4/27/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Wed 4/27/05	Wed 4/27/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80

WBS		Name			Cost

"Disconnect North CMP wall from 1200 door" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.1.2.8   Open 1200 ton door and park $2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Thu 4/28/05	Fri 4/29/05
4	Mech. Technician II	400%	64 hrs	0 days	Thu 4/28/05	Fri 4/29/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Thu 4/28/05	Fri 4/29/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.1.2.9   Restack CMP Scintillator on top of detector $368.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	16 hrs	0 days	Wed 4/13/05	Wed 4/13/05	$368.00	$0.00	$0.00	$368.00

1.8.1.2.10   Remove North Muon Wall $6,934.00

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	40 hrs	0 days	Mon 5/2/05	Fri 5/6/05
4	Mech. Technician II	400%	160 hrs	0 days	Mon 5/2/05	Fri 5/6/05
5	Mech. Technical Specialist	100%	40 hrs	0 days	Mon 5/2/05	Fri 5/6/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$1,694.00	$0.00	$0.00	$1,694.00
4	Mech. Technician II	400%	$3,680.00	$0.00	$0.00	$3,680.00
5	Mech. Technical Specialist	100%	$1,560.00	$0.00	$0.00	$1,560.00

1.8.1.2.11   Remove North and South CMP extensions $2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Mon 5/9/05	Tue 5/10/05
4	Mech. Technician II	400%	64 hrs	0 days	Mon 5/9/05	Tue 5/10/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Mon 5/9/05	Tue 5/10/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60

WBS	Name				Cost	

"Remove North and South CMP extensions" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.1.2.12	Central Detector Ready to Roll Out	$0.00
1.8.1.2.13	Move Central Detector to Assembly Hall	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Wed 5/11/05	Thu 5/12/05
4	Mech. Technician II	400%	64 hrs	0 days	Wed 5/11/05	Thu 5/12/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Wed 5/11/05	Thu 5/12/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.2	Assembly Hall Tasks	$395,799.20
1.8.2.1	Misc Cable Installation	$98,272.00
1.8.2.1.1	Stereo Ansley Cables	$7,336.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	400%	224 hrs	0 days	Fri 5/20/05	Tue 5/31/05
5	Mech. Technical Specialist	100%	56 hrs	0 days	Fri 5/20/05	Tue 5/31/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$5,152.00	$0.00	$0.00	$5,152.00
5	Mech. Technical Specialist	100%	$2,184.00	$0.00	$0.00	$2,184.00

Notes

Standard run 1 cable carrier crew -- 4 people and Dervin
Installation to superlayer 7 only -- means 10 pulls

2 pulls/day for 1 crew

1 day each end to dress cables into cable carrier slots and install bracketry

WBS	Name	Cost
1.8.2.1.2	Install SVX cables from racks to repeater card ring	$7,136.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	400%	256 hrs	0 days	Wed 6/1/05	Fri 6/10/05
5	Mech. Technical Specialist	50%	32 hrs	0 days	Wed 6/1/05	Fri 6/10/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$5,888.00	$0.00	$0.00	$5,888.00
5	Mech. Technical Specialist	50%	$1,248.00	$0.00	$0.00	$1,248.00

Notes

two technicians 2 days/rack
8 racks to do
16 days for 2 people, 8 days for 4...

WBS	Name	Cost
1.8.2.1.3	Install Silicon Cables from Detector to Repeater Card Ring	$5,240.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	400%	160 hrs	0 days	Wed 6/1/05	Tue 6/7/05
5	Mech. Technical Specialist	100%	40 hrs	0 days	Wed 6/1/05	Tue 6/7/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$3,680.00	$0.00	$0.00	$3,680.00
5	Mech. Technical Specialist	100%	$1,560.00	$0.00	$0.00	$1,560.00

Notes

two people 5 days east, same for the west

WBS	Name	Cost
1.8.2.1.4	Timing Cables upstairs to downstairs	$10,480.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	400%	320 hrs	0 days	Wed 6/8/05	Tue 6/21/05
5	Mech. Technical Specialist	100%	80 hrs	0 days	Wed 6/8/05	Tue 6/21/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$7,360.00	$0.00	$0.00	$7,360.00
5	Mech. Technical Specialist	100%	$3,120.00	$0.00	$0.00	$3,120.00

Notes

1 bunch to each calorimeter rack

There are 12 racks (4 plug, 8 central, 0 endwall)

2 pulls/day, 2 days to prep cable carrier, 2 days to finalize cable carrier

WBS	Name	Cost

"Timing Cables upstairs to downstairs" continued

Notes

10 days total

1.8.2.1.5 — Maintain current infrastructure — $66,240.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	2,880 hrs	0 days	Wed 4/13/05	Tue 1/3/06

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$66,240.00	$0.00	$0.00	$66,240.00

1.8.2.1.6 — Bundle cables for installation — $1,840.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	80 hrs	0 days	Fri 5/13/05	Thu 5/19/05	$1,840.00	$0.00	$0.00	$1,840.00

Notes

This is prep work for cable installation -- laying out cables, adding labels, bundling groups of cables to gether that go to a single corner. Roughly 40 bundles. One crew of 2 can bundle 4 sets/day

1.8.2.2 — Upgrade Silicon Controls and Interlocks — $115,822.00

Notes

Estimate to replace SVX & ISL Simatic with APACS and Quad		
General philosophy		
Read all bulkhead temperatures with Quadlog and trip if too hot		
Read all bulkhead pressures with Quadlog and trip if too high.		
Evaluate critical portions per ANSI S84.01		
APACS provides monitoring, control, first stage interlocks		
Task	ngineering	technician
Rewire 471 devices	2	3
configure 471 I/O	1	
configure logic	2	
checkout	1	2
FIX data base	0.5	2
FIX pictures	0.5	1
Safety Life Cycle evaluation	1	
external reviews	0.5	

WBS	Name	Cost

"Upgrade Silicon Controls and Interlocks" continued

Notes

Spreadsheet from email message from Rich Schmitt dated April 25, 2001

My guess is that this is too low an estimate both in $$$ and effort

ITs probably a couple of weeks just to write the new wiring list from HR rack to quadlog

1.8.2.2.1   Engineer Quadlog Solution, place orders, safety reviews etc $68,776.00

ID	Resource Name	Units	Work	Delay	Start	Finish
1	FNALOP	0%	0 hrs	0 days	Wed 4/13/05	Wed 4/13/05
3	Mech. Engineer II	100%	160 hrs	0 days	Wed 4/13/05	Tue 5/10/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALOP	0%	$62,000.00	$0.00	$0.00	$62,000.00
3	Mech. Engineer II	100%	$6,776.00	$0.00	$0.00	$6,776.00

1.8.2.2.2   Write Quadlog Code $20,328.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	480 hrs	0 days	Wed 5/11/05	Thu 8/4/05	$20,328.00	$0.00	$0.00	$20,328.00

1.8.2.2.3   Install Quadlog infrastructure $1,104.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	48 hrs	0 days	Wed 5/11/05	Fri 5/13/05	$1,104.00	$0.00	$0.00	$1,104.00

1.8.2.2.4   Rewire from Home Run Rack to Quadlog $22,080.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	960 hrs	0 days	Wed 5/11/05	Thu 8/4/05	$22,080.00	$0.00	$0.00	$22,080.00

1.8.2.2.5   Test and Dubug $3,534.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	40 hrs	0 days	Fri 8/5/05	Thu 8/11/05	$1,694.00	$0.00	$0.00	$1,694.00
4	Mech. Technician II	200%	80 hrs	0 days	Fri 8/5/05	Thu 8/11/05	$1,840.00	$0.00	$0.00	$1,840.00

1.8.2.2.6   Place Hardware order $0.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	0 hrs	0 days	Tue 5/10/05	Tue 5/10/05	$0.00	$0.00	$0.00	$0.00

WBS	Name	Cost
1.8.2.3	Cryo Platform	$16,424.40
1.8.2.3.1	Design new Cryo platform	$9,490.40

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	Designer	100%	160 hrs	0 days	Wed 4/13/05	Tue 5/10/05	$6,102.40	$0.00	$0.00	$6,102.40
3	Mech. Engineer II	50%	80 hrs	0 days	Wed 4/13/05	Tue 5/10/05	$3,388.00	$0.00	$0.00	$3,388.00

1.8.2.3.2	Improve Cryo Platform access	$6,934.00

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	40 hrs	0 days	Thu 6/2/05	Wed 6/8/05
4	Mech. Technician II	400%	160 hrs	0 days	Thu 6/2/05	Wed 6/8/05
5	Mech. Technical Specialist	100%	40 hrs	0 days	Thu 6/2/05	Wed 6/8/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$1,694.00	$0.00	$0.00	$1,694.00
4	Mech. Technician II	400%	$3,680.00	$0.00	$0.00	$3,680.00
5	Mech. Technical Specialist	100%	$1,560.00	$0.00	$0.00	$1,560.00

1.8.2.4	Improve Access to Silicon Racks	$18,353.60
1.8.2.4.1	Design new silicon rack access	$9,153.60

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	Designer	100%	240 hrs	0 days	Wed 4/13/05	Tue 5/24/05	$9,153.60	$0.00	$0.00	$9,153.60

1.8.2.4.2	Construct access platforms	$7,360.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	320 hrs	0 days	Wed 4/13/05	Tue 5/10/05	$7,360.00	$0.00	$0.00	$7,360.00

Notes

1 week to build each one, 4 platforms

1.8.2.4.3	Install platforms	$1,840.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	80 hrs	0 days	Wed 5/11/05	Tue 5/17/05	$1,840.00	$0.00	$0.00	$1,840.00

1.8.2.5	Flammable Gas	$36,048.00
1.8.2.5.1	Engineering	$20,328.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	480 hrs	0 days	Wed 4/13/05	Thu 7/7/05	$20,328.00	$0.00	$0.00	$20,328.00

WBS		Name				Cost	
1.8.2.5.2		Complete CF4 piping, valving instrumentation				$15,720.00	

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	480 hrs	0 days	Wed 5/11/05	Wed 6/22/05
5	Mech. Technical Specialist	50%	120 hrs	0 days	Wed 5/11/05	Wed 6/22/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$11,040.00	$0.00	$0.00	$11,040.00
5	Mech. Technical Specialist	50%	$4,680.00	$0.00	$0.00	$4,680.00

WBS	Name	Cost
1.8.2.6	SVXII Removal	$18,484.00

1.8.2.6.1		Open Both Endplugs				$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Wed 5/11/05	Wed 5/11/05
4	Mech. Technician II	400%	32 hrs	0 days	Wed 5/11/05	Wed 5/11/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Wed 5/11/05	Wed 5/11/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.2.6.2		Install South Transporter				$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Thu 5/12/05	Thu 5/12/05
4	Mech. Technician II	400%	32 hrs	0 days	Thu 5/12/05	Thu 5/12/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Thu 5/12/05	Thu 5/12/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.2.6.3		uncable west endplug				$1,472.00			

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	64 hrs	0 days	Fri 5/13/05	Mon 5/16/05	$1,472.00	$0.00	$0.00	$1,472.00

WBS	Name	Cost
1.8.2.6.4	Install Blue Frame and Rotate West Endplug	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Tue 5/17/05	Wed 5/18/05
4	Mech. Technician II	400%	64 hrs	0 days	Tue 5/17/05	Wed 5/18/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Tue 5/17/05	Wed 5/18/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.2.6.5	Uncable Silicon inside bore	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Thu 5/19/05	Fri 5/20/05
4	Mech. Technician II	400%	64 hrs	0 days	Thu 5/19/05	Fri 5/20/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Thu 5/19/05	Fri 5/20/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.2.6.6	Install Rail System	$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Mon 5/23/05	Mon 5/23/05
4	Mech. Technician II	400%	32 hrs	0 days	Mon 5/23/05	Mon 5/23/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Mon 5/23/05	Mon 5/23/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

WBS	Name	Cost
1.8.2.6.7	Remove Silicon Cables from 30 degree	$3,144.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	96 hrs	0 days	Wed 5/11/05	Wed 5/18/05
5	Mech. Technical Specialist	50%	24 hrs	0 days	Wed 5/11/05	Wed 5/18/05

WBS	Name	Cost

"Remove Silicon Cables from 30 degree" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$2,208.00	$0.00	$0.00	$2,208.00
5	Mech. Technical Specialist	50%	$936.00	$0.00	$0.00	$936.00

Notes

2 guys, 3 days per bore

1.8.2.6.8   Remove SVX II $2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Tue 5/24/05	Wed 5/25/05
4	Mech. Technician II	400%	64 hrs	0 days	Tue 5/24/05	Wed 5/25/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Tue 5/24/05	Wed 5/25/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.2.6.9   Ready to be Transported to Sci Det $1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Thu 5/26/05	Thu 5/26/05
4	Mech. Technician II	400%	32 hrs	0 days	Thu 5/26/05	Thu 5/26/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Thu 5/26/05	Thu 5/26/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.2.6.10   Silicon Detector Required at Sci Det $0.00

1.8.2.7   Preradiator Installation $40,147.60

1.8.2.7.1   Pull Arch while preserving COT rack access $5,547.20

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	32 hrs	0 days	Thu 5/26/05	Wed 6/1/05
4	Mech. Technician II	400%	128 hrs	0 days	Thu 5/26/05	Wed 6/1/05
5	Mech. Technical Specialist	100%	32 hrs	0 days	Thu 5/26/05	Wed 6/1/05

WBS		Name			Cost			

"Pull Arch while preserving COT rack access" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$1,355.20	$0.00	$0.00	$1,355.20
4	Mech. Technician II	400%	$2,944.00	$0.00	$0.00	$2,944.00
5	Mech. Technical Specialist	100%	$1,248.00	$0.00	$0.00	$1,248.00

1.8.2.7.2   Remove old preradiator and crack chambers $7,360.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	320 hrs	0 days	Thu 6/2/05	Wed 6/15/05	$7,360.00	$0.00	$0.00	$7,360.00

Notes
2 guys can do 1 arch in 1 week

1.8.2.7.3   Remove obsolete infrastructure (cables, gas, etc) $3,680.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	160 hrs	0 days	Thu 6/16/05	Wed 6/22/05	$3,680.00	$0.00	$0.00	$3,680.00

Notes
2 guys can do 1 arch in 1/2 week

1.8.2.7.4   Install new preradiator and crack chambers $10,480.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	400%	320 hrs	0 days	Thu 6/23/05	Thu 7/7/05
5	Mech. Technical Specialist	50%	80 hrs	0 days	Thu 6/23/05	Thu 7/21/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$7,360.00	$0.00	$0.00	$7,360.00
5	Mech. Technical Specialist	50%	$3,120.00	$0.00	$0.00	$3,120.00

Notes
2 guys can install new detectors 1 arch in 2 weeks

1.8.2.7.5   Install new cables/infrastructure $8,920.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	400%	320 hrs	0 days	Fri 7/22/05	Thu 8/4/05
5	Mech. Technical Specialist	50%	40 hrs	0 days	Fri 7/22/05	Thu 8/4/05

WBS	Name	Cost

"Install new cables/infrastructure" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$7,360.00	$0.00	$0.00	$7,360.00
5	Mech. Technical Specialist	50%	$1,560.00	$0.00	$0.00	$1,560.00

Notes

New cables, 2 guys 1 week per arch

1.8.2.7.6					Close Arches	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Fri 8/5/05	Mon 8/8/05
4	Mech. Technician II	400%	64 hrs	0 days	Fri 8/5/05	Mon 8/8/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Fri 8/5/05	Mon 8/8/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.2.7.7	Remove South Transporter/concrete blocks	$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	8 hrs	0 days	Tue 8/9/05	Tue 8/9/05	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	32 hrs	0 days	Tue 8/9/05	Tue 8/9/05	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	8 hrs	0 days	Tue 8/9/05	Tue 8/9/05	$312.00	$0.00	$0.00	$312.00

1.8.2.8	Calorimeter Timing	$41,068.00

1.8.2.8.1	Remove phototube bases from arch	$2,944.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	128 hrs	0 days	Wed 5/11/05	Fri 5/20/05	$2,944.00	$0.00	$0.00	$2,944.00

Notes

20 bases/wedge

48 wedges

10 per hour per man

1000 tubes 10 tubes/hour= 100 hours 3/4 efficiency per day 8 hours/day = 17 man days

WBS	Name	Cost
1.8.2.8.2	Recondition Bases	$0.00

Notes

Estimate taken directly out of Table 3

30 minutes/tube to modify connector and test

One person can do 15 tubes/day

2 people can do the job in 33 days as long as we keep them supplied in tubes

NOTE, NEED TO HAVE AT LEAST 3 PEOPLE DOING THIS -- OTHERWISE INSTALLATION GUYS SLOW DOWN AFTER 28 DAYS INTO THE PROJECT

WBS	Name	Cost
1.8.2.8.3	Install reconditioned bases	$13,248.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	300%	576 hrs	0 days	Mon 5/23/05	Fri 6/24/05	$13,248.00	$0.00	$0.00	$13,248.00

Notes

Clean tube and transition piece, install pieces, tape to prevent light leaks

0.25 hours/tube * 1000 tubes = 250 hours

3/4 efficiency * 8 hours/day * 250 hours = 42 man days

in people, I have 2 guys working flat out installing, and 1 guy feeding the other two equipment...

WBS	Name	Cost
1.8.2.8.4	Install wiring harness+test	$22,300.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	400%	800 hrs	0 days	Mon 6/27/05	Mon 8/1/05
5	Mech. Technical Specialist	50%	100 hrs	0 days	Mon 6/27/05	Mon 8/1/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	400%	$18,400.00	$0.00	$0.00	$18,400.00
5	Mech. Technical Specialist	50%	$3,900.00	$0.00	$0.00	$3,900.00

Notes

plug and central need wiring harnesses

For Central
  12 harness's/arch * 4 arches = 48 harness's need to be installed

  Each harness has 20 connectors

WBS	Name	Cost

"Install wiring harness+test" continued

Notes

Dress cables at both ends

2 hours/harness or 24 days for one crew

For Plug

12 harness/plug, 24 that need to be installed

2 hours/harness or 12 days for one crew

Assume Assume 25% problems = 5 additional days in testing

WBS	Name	Cost
1.8.2.8.5	Install ASD + Transition boards, dress cables in rack	$2,576.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	112 hrs	0 days	Tue 8/2/05	Wed 8/10/05	$2,576.00	$0.00	$0.00	$2,576.00

Notes

plug and central racks

1/2 day per rack -- 12 racks

1 day to plug in cards

WBS	Name	Cost
1.8.2.9	SVX III Installation	$11,179.60
1.8.2.9.1	Silicon Ready for installation	$0.00
1.8.2.9.2	Transport Silicon from Sci Det to CDF	$0.00
1.8.2.9.3	Insert Silicon into Bore	$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Wed 7/13/05	Wed 7/13/05
4	Mech. Technician II	400%	32 hrs	0 days	Wed 7/13/05	Wed 7/13/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Wed 7/13/05	Wed 7/13/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

WBS		Name					Cost			
1.8.2.9.4			Inchworm tests and survey				$0.00			

1.8.2.9.5		Dress cables well enough to close plugs					$736.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	32 hrs	0 days	Tue 7/19/05	Wed 7/20/05	$736.00	$0.00	$0.00	$736.00

1.8.2.9.6			Rotate west endplug in AH			$2,773.60	
ID	Resource Name	Units	Work	Delay	Start	Finish	
3	Mech. Engineer II	100%	16 hrs	0 days	Thu 7/21/05	Fri 7/22/05	
4	Mech. Technician II	400%	64 hrs	0 days	Thu 7/21/05	Fri 7/22/05	
5	Mech. Technical Specialist	100%	16 hrs	0 days	Thu 7/21/05	Fri 7/22/05	

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.2.9.7		West Endplug Cabling					$736.00			
ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	32 hrs	0 days	Mon 7/25/05	Tue 7/26/05	$736.00	$0.00	$0.00	$736.00

Notes

1 person 2 days for each rack 2 racks per plug

1.8.2.9.8			Mount endplugs on rails			$1,386.80	
ID	Resource Name	Units	Work	Delay	Start	Finish	
3	Mech. Engineer II	100%	8 hrs	0 days	Mon 7/25/05	Mon 7/25/05	
4	Mech. Technician II	400%	32 hrs	0 days	Mon 7/25/05	Mon 7/25/05	
5	Mech. Technical Specialist	100%	8 hrs	0 days	Mon 7/25/05	Mon 7/25/05	

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.2.9.9			Close Plugs in Assembly Hall			$2,773.60	
ID	Resource Name	Units	Work	Delay	Start	Finish	
3	Mech. Engineer II	100%	16 hrs	0 days	Tue 7/26/05	Wed 7/27/05	
4	Mech. Technician II	400%	64 hrs	0 days	Tue 7/26/05	Wed 7/27/05	

WBS		Name				Cost	

"Close Plugs in Assembly Hall" continued

ID	Resource Name	Units	Work	Delay	Start	Finish
5	Mech. Technical Specialist	100%	16 hrs	0 days	Tue 7/26/05	Wed 7/27/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.2.9.10	Remove endplug extension rails	$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Thu 7/28/05	Thu 7/28/05
4	Mech. Technician II	400%	32 hrs	0 days	Thu 7/28/05	Thu 7/28/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Thu 7/28/05	Thu 7/28/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

WBS	Name	Cost
1.8.2.9.11	Central Detector Ready for Roll In	$0.00
1.8.3	Run IIB Roll in	$64,612.20
1.8.3.1	Central Detector installation	$31,203.00
1.8.3.1.1	Pull Detector	$693.40

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	4 hrs	0 days	Wed 8/10/05	Wed 8/10/05
4	Mech. Technician II	400%	16 hrs	0 days	Wed 8/10/05	Wed 8/10/05
5	Mech. Technical Specialist	100%	4 hrs	0 days	Wed 8/10/05	Wed 8/10/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$169.40	$0.00	$0.00	$169.40
4	Mech. Technician II	400%	$368.00	$0.00	$0.00	$368.00
5	Mech. Technical Specialist	100%	$156.00	$0.00	$0.00	$156.00

Notes

longer detector roll in reflects installing South CMP Wing

WBS	Name	Cost
1.8.3.1.2	Install south CMP "wing"	$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Wed 8/10/05	Thu 8/11/05
4	Mech. Technician II	400%	32 hrs	0 days	Wed 8/10/05	Thu 8/11/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Wed 8/10/05	Thu 8/11/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

WBS	Name	Cost
1.8.3.1.3	Push detector into position and survey	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Thu 8/11/05	Mon 8/15/05
4	Mech. Technician II	400%	64 hrs	0 days	Thu 8/11/05	Mon 8/15/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Thu 8/11/05	Mon 8/15/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.3.1.4	Remove Hillman Rollers	$1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Mon 8/15/05	Tue 8/16/05
4	Mech. Technician II	400%	32 hrs	0 days	Mon 8/15/05	Tue 8/16/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Mon 8/15/05	Tue 8/16/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

WBS	Name	Cost
1.8.3.1.5	Install CMX 30 degree sections	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Tue 8/16/05	Thu 8/18/05
4	Mech. Technician II	400%	64 hrs	0 days	Tue 8/16/05	Thu 8/18/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Tue 8/16/05	Thu 8/18/05

| WBS | | Name | | | | Cost | |

"Install CMX 30 degree sections" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.3.1.6 — Open Endplugs — $1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Thu 8/18/05	Fri 8/19/05
4	Mech. Technician II	400%	32 hrs	0 days	Thu 8/18/05	Fri 8/19/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Thu 8/18/05	Fri 8/19/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.3.1.7 — Install North CMP "Wing" — $1,386.80

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	8 hrs	0 days	Fri 8/19/05	Mon 8/22/05
4	Mech. Technician II	400%	32 hrs	0 days	Fri 8/19/05	Mon 8/22/05
5	Mech. Technical Specialist	100%	8 hrs	0 days	Fri 8/19/05	Mon 8/22/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$338.80	$0.00	$0.00	$338.80
4	Mech. Technician II	400%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	100%	$312.00	$0.00	$0.00	$312.00

1.8.3.1.8 — Install pit steel — $4,160.40

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	24 hrs	0 days	Mon 8/22/05	Thu 8/25/05
4	Mech. Technician II	400%	96 hrs	0 days	Mon 8/22/05	Thu 8/25/05
5	Mech. Technical Specialist	100%	24 hrs	0 days	Mon 8/22/05	Thu 8/25/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$1,016.40	$0.00	$0.00	$1,016.40
4	Mech. Technician II	400%	$2,208.00	$0.00	$0.00	$2,208.00
5	Mech. Technical Specialist	100%	$936.00	$0.00	$0.00	$936.00

WBS	Name	Cost
1.8.3.1.9	Install north muon wall	$6,934.00

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	40 hrs	0 days	Thu 8/25/05	Thu 9/1/05
4	Mech. Technician II	400%	160 hrs	0 days	Thu 8/25/05	Thu 9/1/05
5	Mech. Technical Specialist	100%	40 hrs	0 days	Thu 8/25/05	Thu 9/1/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$1,694.00	$0.00	$0.00	$1,694.00
4	Mech. Technician II	400%	$3,680.00	$0.00	$0.00	$3,680.00
5	Mech. Technical Specialist	100%	$1,560.00	$0.00	$0.00	$1,560.00

WBS	Name	Cost
1.8.3.1.10	Close 1200 ton door	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Thu 9/1/05	Tue 9/6/05
4	Mech. Technician II	400%	64 hrs	0 days	Thu 9/1/05	Tue 9/6/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Thu 9/1/05	Tue 9/6/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.3.1.11	Install Miniplugs	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Tue 9/6/05	Thu 9/8/05
4	Mech. Technician II	400%	64 hrs	0 days	Tue 9/6/05	Thu 9/8/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Tue 9/6/05	Thu 9/8/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.3.1.12	Install Beampipes	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Tue 9/13/05	Thu 9/15/05
4	Mech. Technician II	400%	64 hrs	0 days	Tue 9/13/05	Thu 9/15/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Tue 9/13/05	Thu 9/15/05

WBS		Name				Cost			

"Install Beampipes" continued

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

1.8.3.1.13	Central Detector Installed in Collision Hall	$0.00
1.8.3.2	Connections and Checkout	$11,896.00
1.8.3.2.1	Connect AC Power to Detectors	$368.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	16 hrs	0 days	Mon 8/15/05	Tue 8/16/05	$368.00	$0.00	$0.00	$368.00

1.8.3.2.2	Connect Water and SUVA	$524.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	16 hrs	0 days	Mon 8/15/05	Tue 8/16/05
5	Mech. Technical Specialist	50%	4 hrs	0 days	Mon 8/15/05	Tue 8/16/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$368.00	$0.00	$0.00	$368.00
5	Mech. Technical Specialist	50%	$156.00	$0.00	$0.00	$156.00

1.8.3.2.3	Connect Flammable Gas	$524.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	16 hrs	0 days	Mon 8/15/05	Tue 8/16/05
5	Mech. Technical Specialist	50%	4 hrs	0 days	Mon 8/15/05	Tue 8/16/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$368.00	$0.00	$0.00	$368.00
5	Mech. Technical Specialist	50%	$156.00	$0.00	$0.00	$156.00

1.8.3.2.4	Connect Solenoid and begin cooldown`	$7,860.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	240 hrs	0 days	Mon 8/15/05	Tue 9/6/05
5	Mech. Technical Specialist	50%	60 hrs	0 days	Mon 8/15/05	Tue 9/6/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$5,520.00	$0.00	$0.00	$5,520.00
5	Mech. Technical Specialist	50%	$2,340.00	$0.00	$0.00	$2,340.00

WBS	Name	Cost
1.8.3.2.5	Install muon wall water/cables/power	$2,620.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	80 hrs	0 days	Thu 9/1/05	Fri 9/9/05
5	Mech. Technical Specialist	50%	20 hrs	0 days	Thu 9/1/05	Fri 9/9/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$1,840.00	$0.00	$0.00	$1,840.00
5	Mech. Technical Specialist	50%	$780.00	$0.00	$0.00	$780.00

WBS	Name	Cost
1.8.3.3	Complete Silicon Installation	$10,872.00
1.8.3.3.1	Connect Si cooling and interlock cables	$1,048.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	32 hrs	0 days	Fri 8/19/05	Tue 8/23/05
5	Mech. Technical Specialist	50%	8 hrs	0 days	Fri 8/19/05	Tue 8/23/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$736.00	$0.00	$0.00	$736.00
5	Mech. Technical Specialist	50%	$312.00	$0.00	$0.00	$312.00

WBS	Name	Cost
1.8.3.3.2	Connect Silicon Cables to Detector	$3,312.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	300%	144 hrs	0 days	Tue 8/23/05	Wed 8/31/05	$3,312.00	$0.00	$0.00	$3,312.00

WBS	Name	Cost
1.8.3.3.3	Connect Sil Rack Cables to Repeater Cards	$4,416.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	300%	192 hrs	0 days	Wed 8/31/05	Tue 9/13/05	$4,416.00	$0.00	$0.00	$4,416.00

WBS	Name	Cost
1.8.3.3.4	Checkout Silicon Cooling and Interlocks	$2,096.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Mech. Technician II	200%	64 hrs	0 days	Tue 8/23/05	Mon 8/29/05
5	Mech. Technical Specialist	50%	16 hrs	0 days	Tue 8/23/05	Mon 8/29/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Mech. Technician II	200%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	50%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.3.3.5	Silicon Readout Debugging	$0.00
1.8.3.3.6	Silicon Ready to be powered	$0.00

WBS	Name	Cost
1.8.3.4	Prepare to Exit Collision Hall	$10,641.20
1.8.3.4.1	Close plugs	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Thu 9/15/05	Mon 9/19/05
4	Mech. Technician II	400%	64 hrs	0 days	Thu 9/15/05	Mon 9/19/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Thu 9/15/05	Mon 9/19/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.3.4.2	Solenoid checkout	$5,094.00

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	40 hrs	0 days	Mon 9/19/05	Mon 9/26/05
4	Mech. Technician II	200%	80 hrs	0 days	Mon 9/19/05	Mon 9/26/05
5	Mech. Technical Specialist	100%	40 hrs	0 days	Mon 9/19/05	Mon 9/26/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$1,694.00	$0.00	$0.00	$1,694.00
4	Mech. Technician II	200%	$1,840.00	$0.00	$0.00	$1,840.00
5	Mech. Technical Specialist	100%	$1,560.00	$0.00	$0.00	$1,560.00

WBS	Name	Cost
1.8.3.4.3	Solenoid Powered	$0.00
1.8.3.4.4	Close Muon Steel	$2,773.60

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	16 hrs	0 days	Mon 9/19/05	Wed 9/21/05
4	Mech. Technician II	400%	64 hrs	0 days	Mon 9/19/05	Wed 9/21/05
5	Mech. Technical Specialist	100%	16 hrs	0 days	Mon 9/19/05	Wed 9/21/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$677.60	$0.00	$0.00	$677.60
4	Mech. Technician II	400%	$1,472.00	$0.00	$0.00	$1,472.00
5	Mech. Technical Specialist	100%	$624.00	$0.00	$0.00	$624.00

WBS	Name	Cost
1.8.4	Ready for Collisions	$0.00

WBS	Name	Cost
1.8.5	Project Management	$50,820.00

ID	Resource Name	Units	Work	Delay	Start	Finish
3	Mech. Engineer II	100%	1,200 hrs	0 days	Thu 3/3/05	Mon 10/3/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
3	Mech. Engineer II	100%	$50,820.00	$0.00	$0.00	$50,820.00

Notes

Project engineer

Will write JHA's, safety reviews, procedures, maintain schedules, performance reviews, preparing for endless series of reviews....

WBS	Name	Cost
1.9	Administration	$466,480.00

Notes

This summary task covers all the administrative costs associated with the design and construction of the CDF Run IIb project.

WBS	Name	Cost
1.9.1	Fiscal Years	$0.00

Notes

This summary task will hold tags for the Fiscal years.

WBS	Name	Cost
1.9.1.1	Fiscal Year 2002	$0.00
1.9.1.2	Fiscal Year 2003	$0.00
1.9.1.3	Fiscal Year 2004	$0.00
1.9.1.4	Fiscal Year 2005	$0.00
1.9.1.5	Fiscal Year 2006	$0.00
1.9.2	Design Phase	$65,500.00

Notes

This task covers all the administrative costs associated with the design phase of the project. This task will be complete when the project has been baselined, and received CD-3.

WBS	Name	Cost
1.9.2.1	Miscellaneous	$50,500.00
1.9.2.1.1	Silicon Management	$40,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$40,000.00	$0.00	$0.00	$40,000.00

WBS	Name	Cost
1.9.2.1.2	Administrative computing	$10,500.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
2	FNALR&D	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$7,000.00	$0.00	$0.00	$7,000.00

WBS	Name					Cost			

"Administrative computing" continued

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	3	FNALCont	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$3,500.00	$0.00	$0.00	$3,500.00

1.9.2.2	Travel	$15,000.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	2	FNALR&D	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$10,000.00	$0.00	$0.00	$10,000.00
	3	FNALCont	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$5,000.00	$0.00	$0.00	$5,000.00

Notes

Cost Assumptions:

1 trip to Japan - $5000 each
5 trips to US vendors - $1000 each

1.9.2.3	Project receives CD-3	$0.00

1.9.3	Construction Phase	$400,980.00

Notes

This summary task covers the administrative costs incurred during the construction phase of the project. It will be complete when the construction of all other subprojects is complete.

1.9.3.1	Miscellaneous	$400,980.00

1.9.3.1.1	Visitors	$75,000.00

1.9.3.1.1.1	Silicon Management	$75,000.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	1	FNALEQ	0%	0 hrs	0 days	Mon 10/10/05	Mon 10/10/05	$50,000.00	$0.00	$0.00	$50,000.00
	3	FNALCont	0%	0 hrs	0 days	Mon 10/10/05	Mon 10/10/05	$25,000.00	$0.00	$0.00	$25,000.00

1.9.3.1.2	Travel	$90,000.00

1.9.3.1.2.1	Travel - FY 2002	$15,000.00

	ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
	1	FNALEQ	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$10,000.00	$0.00	$0.00	$10,000.00
	3	FNALCont	0%	0 hrs	0 days	Mon 1/7/02	Mon 1/7/02	$5,000.00	$0.00	$0.00	$5,000.00

Notes

Cost Assumptions:

1 trip to Japan - $5000 each
5 trips to US vendors - $1000 each

WBS	Name	Cost
1.9.3.1.2.2	Travel - FY 2003	$30,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Tue 10/1/02	Tue 10/1/02	$20,000.00	$0.00	$0.00	$20,000.00
3	FNALCont	0%	0 hrs	0 days	Tue 10/1/02	Tue 10/1/02	$10,000.00	$0.00	$0.00	$10,000.00

Notes
Cost Assumptions:

2 trip to Japan - $5000 each
10 trips to US vendors - $1000 each

WBS	Name	Cost
1.9.3.1.2.3	Travel - FY 2004	$30,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Wed 10/1/03	Wed 10/1/03	$20,000.00	$0.00	$0.00	$20,000.00
3	FNALCont	0%	0 hrs	0 days	Wed 10/1/03	Wed 10/1/03	$10,000.00	$0.00	$0.00	$10,000.00

Notes
Cost Assumptions:

2 trip to Japan - $5000 each
10 trips to US vendors - $1000 each

WBS	Name	Cost
1.9.3.1.2.4	Travel - FY 2005	$15,000.00

ID	Resource Name	Units	Work	Delay	Start	Finish	Cost	Baseline Cost	Act. Cost	Rem. Cost
1	FNALEQ	0%	0 hrs	0 days	Fri 10/1/04	Fri 10/1/04	$10,000.00	$0.00	$0.00	$10,000.00
3	FNALCont	0%	0 hrs	0 days	Fri 10/1/04	Fri 10/1/04	$5,000.00	$0.00	$0.00	$5,000.00

Notes
Cost Assumptions:

1 trip to Japan - $5000 each
5 trips to US vendors - $1000 each

WBS	Name	Cost
1.9.3.1.3	Administrative support	$235,980.00

ID	Resource Name	Units	Work	Delay	Start	Finish
4	Computer Professional V	100%	6,000 hrs	0 days	Tue 10/1/02	Mon 10/10/05

ID	Resource Name	Units	Cost	Baseline Cost	Act. Cost	Rem. Cost
4	Computer Professional V	100%	$235,980.00	$0.00	$0.00	$235,980.00

WBS	Name	Cost

"Administrative support" continued

Notes

We need a better resource here, but this is to cover two people, half time, for the duration of the project. The people are Carol (Admin. Assist.) and Dale (Financial specialist).

WBS	Name	Cost
2	CPR2April10	$945,050.28
3	tempDAQ	$1,199,907.20
4	EMTimingOct01	$204,480.00
5	I & I V3.0	$555,437.00
6	AdminJan02	$466,480.00